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THE VETERINARY JOURNAL

A Monthly Review of Veterinary Science.

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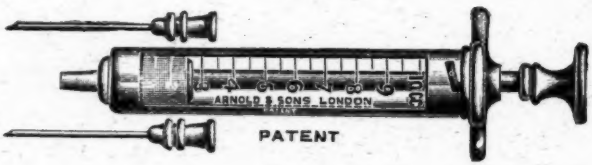

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CONTENTS.

	PAGE
THE LATE DR. ROBERT KOCH, 1844-1910	309
EDITORIALS—	
The late King Edward VII.	311
King George V.	312
Instruction in Zootechny	313
The Treatment of Tetanus	314
GENERAL ARTICLES—	
Antituberculous Vaccination in the Ox. By M. S. ARLOING	315
Means of Control of Horses. By J. M. CHRISTY, M.R.C.V.S.	326
Resolutions of the Ninth International Veterinary Congress at the Hague, September 13-19, 1909	334
CLINICAL ARTICLES—	
A Case of Valvular Disease with Dilatation. By Major W. R. WALKER, A.V.C.	347
Botryomycosis following Castration in the Pig. By B. FRACARO	347
Compound Fracture of the Nasal Bone in a Horse. By Professor W. C. SCHIMMELL	348
CANINE CLINICAL NOTES	349
ABSTRACTS AND REPORTS	353
REVIEW	364
MISCELLANEOUS	365
TRANSLATIONS	369
INSTRUMENTS AND DRUGS	371

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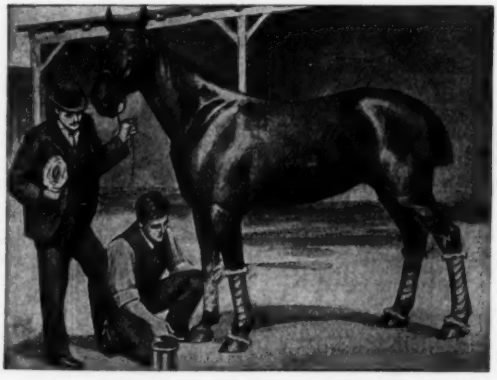

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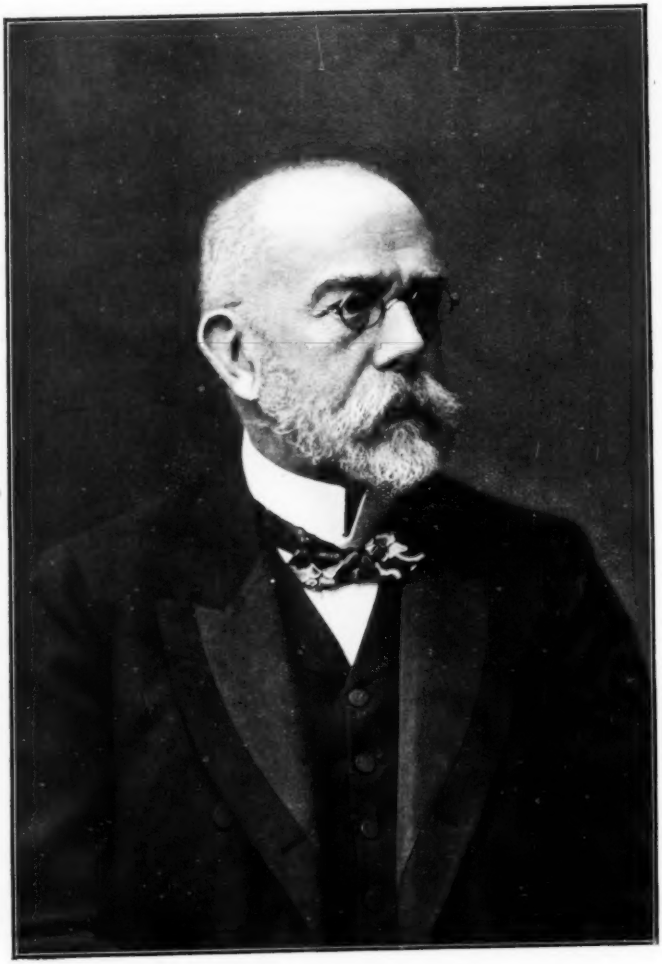

HIS EXCELLENCY ROBERT KOCH.

THE

VETERINARY JOURNAL

JUNE, 1910.

THE LATE DR. ROBERT KOCH, 1844-1910.

THE world of science, and in fact mankind in general, has sustained a severe loss by the death of Dr. Koch, which has occurred at Baden-Baden from heart disease. Robert Koch was born at Klausthal in Hanover, being one of a family of thirteen. and, adopting medicine as a profession, he took his degree at the University of Göttingen in 1866, and after a while engaged in private practice at Posen. When the Franco-Prussian War broke out he volunteered as a medical officer, and afterwards was appointed health officer at Wallstein. It was here he seriously commenced his bacteriological researches, finding himself in a country where anthrax was very rife. In 1876 he was able to prove definitely that anthrax was due to a specific bacillus. Pasteur had preceded him by some years in establishing the germ theory of disease in connection with silk-worm disease. As the result of his early work Koch formulated certain postulates which were destined to be adopted by all bacteriologists, These conditions, which he considered ought to be fulfilled before an organism could be definitely regarded as the cause of a given disease, were: (1) The organism must be found within the tissues of the animal; (2) the organism must be capable of cultivation in suitable media outside the animal body; (3) the pure culture must be capable of producing the disease in question when inoculated into a susceptible animal;

and (4) the organism must be again found in the inoculated animal.

Dr. Koch's next great triumph was his discovery of the tubercle bacillus in 1882, and it is in this connection that he is best known in this country. It is impossible to estimate the enormous amount of work he did in tuberculosis and that he made possible as the result of his various researches. Much of his work on bovine tuberculosis was done in collaboration with Professor Schütz, of the Veterinary High School of Berlin. He introduced tuberculin, which has proved such a boon to veterinary surgeons in the diagnosis of tuberculosis. His startling statements at the London Congress in 1901 were directly responsible for the appointment of the second British Royal Commission on Tuberculosis, which has done so much excellent work and reported against Koch's views. Other diseases investigated by him are cholera, plague, and sleeping sickness in men, and piroplasmosis and rinderpest in cattle.

In 1904 Dr. Koch was provided by the German Government with a modern laboratory, and was freed from his teaching duties to devote his whole time to research. He possessed the Order of Merit (Germany), and the Kaiser conferred on him the title of Excellency. He was a Fellow of the Royal Society of England, and in 1905 he received the Nobel Prize for Medicine. Koch's name will be handed down to posterity, and will rank with such names as Pasteur, Virchow, and Lister.

Editorials.

THE LATE KING EDWARD VII.

THERE is no body of men in the whole of the British Empire more sincerely loyal than that comparatively small body which comprises the veterinary profession. Hence the news of the death of King Edward VII. came to us individually and collectively as a terrible shock, causing us the deepest heartfelt sorrow. So much has been said and written of King Edward that little is left for us to say, but we are certain that every member of the Royal College of Veterinary Surgeons will sincerely endorse the action of our Council as reported elsewhere in this issue of the VETERINARY JOURNAL. The words of our President will be echoed in the hearts of all members of the profession, and we owe him thanks for so adequately expressing our deepest sympathy with the sorrowing Royal Family.

Above all things, veterinary surgeons like a man to be a man and a sportsman. Edward VII. was a veritable "king of men and of sportsmen," and as such he appealed to us almost as much as by his broad, human sympathies and his incomparable statesmanship. As an agriculturist, too, the late King occupied a leading position, exhibiting and frequently winning at various agricultural shows, and so stimulating the breeding of good stock. He modestly described himself as "a farmer on a small scale." He was a good shot but a better yachtsman, and an enthusiastic motorist. It was, however, in connection with his racehorses that his sportsmanship reached its culminating point. He won the Derby three times—twice as Prince of Wales, with Persimmon in 1896, and with Diamond Jubilee in 1900—but the crowning achievement of his racing career came last year, when for the first time a reigning monarch carried off the coveted Blue Riband of the Turf with Minoru. Few of us will ever forget the wild excitement and cheering when Minoru was led into the Enclosure by its Royal owner. The crowds cheered and cheered until they could cheer no more. Only on the day of his death his horse Witch of the Air won at Kempton. It may not be known to many that when Prince of Wales he also tasted the delights of the winning

jockey when riding his own horse Rupee in a steeplechase at the Curragh. Although such an ardent supporter of the Turf, Edward VII. loathed gambling. In a letter he once wrote to Archbishop Benson, the following occurred :—

"I have a horror of gambling, and should always do my utmost to discourage others who have an inclination for it, as I consider that gambling, like intemperance, is one of the greatest curses which the country could be afflicted with.

"Horse racing may produce gambling or it may not, but I have always looked upon it as a manly sport which is popular with Englishmen of all classes ; and there is no reason why it should be looked upon as a gambling transaction. Alas ! those who gamble will gamble at anything."

Our loss is undoubtedly a great one, but that of his immediate family is of necessity far greater. We offer to them our humble sympathy and condolence, and we are thankful that our beloved Queen Alexandra and the other members of the Royal Family have been able to sustain their severe bereavement with such fortitude.

KING GEORGE V.

WHILE mourning our loss of King Edward we have one great consolation, and that is that he left us such a worthy son to take up his work. While Prince of Wales, our new King had not the same opportunities of becoming famous and popular as his illustrious father had, but he made more than excellent use of his opportunities, and of late years was rapidly gaining the love and confidence of those destined to become his subjects. King George V. is the most widely travelled of all monarchs, and possesses more intimate knowledge of Britain beyond the seas than any of his predecessors. To all parts of the Empire he is a known personality, not merely an honoured name.

As a sportsman our new King is second to none, though he has not been able (owing, we believe, to a wish of his father) to take such a part as he would have wished on the Turf. He has inherited all his father's instincts in this direction, and now that he

has also become the owner of his father's famous stud we shall see him develop in his true light. Veterinary surgeons and sportsmen in general are glad to know he intends to maintain that stud, and to know that agriculture and breeding will receive the same support as of old.

King George ascends the throne with high hopes attaching to him, and we trust that his reign may be a long and prosperous one. We fervently echo the words uppermost in the hearts of all loyal British subjects, and say *"God Save King George V."*

INSTRUCTION IN ZOOTECHNY.

THE recommendation of the International Congress that special lectures and demonstrations in this subject should be included in all veterinary curricula is one that will meet with general approval. It is highly necessary that veterinary surgeons should know the distinguishing features at least of the different breeds of live stock, as well as their uses, the most favourable conditions for their existence, &c. Especially is such a general knowledge necessary for the veterinary surgeon who desires to to emigrate to the Colonies, whether he become engaged there in either State service or private practice, and for that reason the Melbourne Veterinary Faculty arranged special lectures and demonstrations in this subject for the student's last year. Now it has been decided to make zootechny a special subject of the third and fourth years, and the student will be specially examined thereon.

Through the courtesy of the Minister of Agriculture for Victoria, arrangements have been made whereby the necessary instruction will be given by the special experts who are already engaged in the departmental service as general instructors in such subjects to the farming community of the State.

Many of the Continental schools have already a completely organized course of lectures in their curriculum, and the subject is one of the greatest importance. It is time that the English veterinary schools attended to this matter, as if placed early in the course it

would do much to make the first or second year student of value to the practitioner with whom he locates himself during the vacation; for nothing annoys or disgusts a client more than to hear a young fellow make mistakes in what are to him (the client) common facts of everyday life. The Melbourne University School may be congratulated here, as also on the Doctor of Veterinary Science Degree, on the lead they have given to the old country.

THE TREATMENT OF TETANUS.

WE make no apology for reprinting from the *Lancet* an account of the treatment of a case of tetanus in a man by means of subcutaneous injections of solutions of sulphate of magnesia. Other cases have been previously reported in man of treatment by intraspinal injections, a series of cases with a large proportion of successful results have been recorded in the Proceedings of the Royal Society of Medicine.

We are not aware of this line of treatment having been adopted in our patients, but, as the treatment of tetanus in horses is at present so unsatisfactory, it might be well worthy of a trial. The intraspinal method is not practicable, but we have little doubt as to the practicability of the subcutaneous injections. The sulphate of magnesia is said not to affect the toxins as they are produced, but it is said to control the spasms and so conserve the patient's strength until he has had time to form his own antitoxin.

If any of our readers should see fit to adopt this line of treatment, we should be glad to hear the results, be they successful or otherwise.

Index B. A. I.

General Articles.

ANTITUBERCULOUS VACCINATION IN THE OX.[1]

By M. S. ARLOING.

Professor at the University, Director of the National Veterinary School at Lyons.

General Preliminary Considerations.

My first trials with antituberculous vaccination go back to the year 1884, when I showed that the virus contained in so-called scrofulous lesions was relatively weakened to that of the greatest part of visceral tuberculoses. I renewed them in 1896-98 after having profoundly modified the virulence of the tubercle bacillus of man up to the point of having made from it a bacillus deprived of the property of occasioning tubercles, save in the peritoneum, with weak or medium doses.

These two series of trials had appeared to be checks because they had been carried out on the rabbit, and the vaccination experiment had been made by the inoculation of a dose of very virulent bacilli relatively much stronger.

Pursuing my studies on the variations of the virulence of the bacilli of tuberculosis, I soon convinced myself (1) that it was possible *to obtain* a whole gamut of bacilli more or less attenuated in their virulence; (2) that it was possible *to find* varieties whose inoculation in ruminants in particular, and by certain ways, did not set up tuberculous lesions. Also at the moment when von Behring announced at Stockholm that he could vaccinate calves, I had already in hand some experiments of vaccination with very weak human bacilli, cultivated by ordinary processes on solid media.

I indicated the results obtained in this kind of vaccination at Milan in December, 1904, at the opening of the experiments of control of the bovo-vaccination of von Behring, undertaken by la Société de Médecine Vétérinaire, practised and directed by M.M. Rossignol and Vallée. These results show that one communicates a strong resistance in young animals of the bovine species by intravenous injection of weak human bacilli maintained in ordinary culture. Unfortunately, increased resistance is not always obtained without *minimal* lesions appearing, whose final disappearance is not always certain.

Antituberculous Vaccines.—Since 1894 I have particularly applied

[1] Ninth International Veterinary Congress at the Hague, September, 1909.

myself to vaccinating with bacilli, of which I have modified the tubercle-producing property by accustoming them to live in homogeneous cultures in the depths of bouillon, glycerinated to 60 per 1,000. It would take too long to record here my lengthy and patient researches to create varieties of bacilli of human and bovine origin by a series of cultures in the depth of bouillon at different temperatures and pressures (they may be found in the records of the Academy of Sciences of Paris, 1898 to 1906. See also Congress of Hygiene held at Berlin in 1907, and Congress of Tuberculosis held at Washington in 1908. I will only mention the essential points in the circumstance.

After having taken fixed characters in new conditions, when one has made them live and propagated them, these bacilli no longer produce the classic tuberculosis of the rabbit and guinea-pig when introduced under the skin or into the veins.

One would believe at first that these bacilli are absolutely deprived of the property of determining tuberculosis. But if one pushes the injection in the peritoneum one obtains tubercles in the great epiploon and the perigastric glands. Hence the tubercle-producing characteristic has not entirely disappeared.

But if one injects $\frac{1}{4}$ c.c. of culture into the veins of a rabbit, the liver, the lungs and spleen, in spite of normal external characters, present lesions recalling those of the Yersin type which one generally attributes to avian bacilli. The liver is very remarkable in this instance. These lesions bordering tuberculous inflammation are in the liver: now simple infiltrations of mononuclear cells, again mononuclear cells and some giant cells without reciprocal order. In the spleen there are epithelioid cells, some giant cells disseminated without order to the interior or outside of the follicles, or one notices an alteration of the protoplasm and of the nucleus of the cells of the follicles. If the dose of bacilli injected has been very weak, infiltration of round cells is very sparse, and one can hardly distinguish them from infiltrations of the same kind which can be met with in the liver of a rabbit pure from all inoculation.

An important point to remember in these small animals is that alterations do not evolve towards a typical tuberculous lesion, they persist in their primitive state however long the subjects survive after injection. The sequelæ are still more interesting in ruminants, notably oxen. When one injects the bacilli as above modified into the blood of ruminants, in the dose which one injects into the rabbit ($\frac{1}{4}$ to $\frac{1}{2}$ c.c.), the probable lesions are so infinitesimal that it is ordinarily impossible to discover them in the young of the bovine species.

With Stozzi and Fernand Arloing I have encountered strongly suspicious points on histological section. But these points comprise starred cells indicating that they are being called upon to transform themselves into fibrous tissue, that is to say, to follow the process of cure of tuberculosis.

I found, therefore, in my possession races of human and bovine bacilli,[1] transmissible in successive cultures, and living well, which do not determine tubercles in a dose of ½ to 1 c.c. in the veins, and which reabsorb themselves very easily into the organism without danger to man in case of accidental inoculation. In fact, they are bacilli containing all the qualities that one could wish for to undertake vaccination of the ox.

As a *résumé*, since 1904, all my experiments in the vaccination of ruminants have been made in the following manner: (*a*) Immunization with the bacilli of human and bovine mammifers in homogeneous culture; (*b*) test of immunized subjects with virulent bacilli of bovine origin in culture on solid media.

Methods of Immunization.

I have tried immunization by three ways: subcutaneous, intravenous, and digestive. The vaccinated subjects have been tested with bovine bacilli, inoculated by one or other of these methods, sometimes by cohabitation with a very advanced tuberculous subject.

I have varied the mode of immunization, for it was important to know the most efficacious and easy to apply. And in order to appreciate more surely the value of this or that method of vaccination, I have tested the vaccinated subjects in several ways, and generally in a severe fashion. The virus employed in the trial inoculations was always tested simultaneously on the rabbit and guinea-pig. Finally, some calf controls were inoculated with the trial virus in sufficient number to give all possible credence to the result. A certain number of subjects had to be sacrificed in determining the doses to employ in each method of vaccination, particularly in intravenous injection.[2]

Sixty subjects of the bovine species, all aged 4 months at least

[1] These bacilli of human or bovine origin are so well modified that they are tolerated by the monkey in the digestive tube or under the skin; they would be then probably devoid of danger to man.

[2] The successive results of my experiments may be found related in the Proceedings of the French Association for the advancement of science, Congress of Lyons, 1906, and in the records of the bureau of scientific researches, Ministry of Public Instruction, years 1904, 1905, 1906, 1907.

and a year old at the most, have been devoted to vaccination experiments proper. They have been accompanied by thirty controls of the same species.

(1) *Technique for Vaccination by Intravenous Injection.*

(*a*) *First Immunizing Inoculation.*—Injection into the jugular of ½ c.c. of a culture of bacilli (human or bovine) aged about a month.

(*b*) *Second Immunizing Inoculation.*—Injection of 1½ c.c. into the same vessel two months later. If dealing with an animal of large size one should give 1 c.c. at the first injection and 1½ c.c. at the second. Subsequently immunity may be continued by subcutaneous inoculations of 2 c.c., made in the neck and flank from year to year.

(2) *Technique for Vaccination by the Subcutaneous Method.*

(*a*) *First Vaccinal Inoculation.*—Injection of 2 c.c. of culture under the skin of the neck, and of 2 c.c. under the skin of the flank (right side).

(*b*) *Second Vaccinal Inoculation.*—(Two months later) 2 c.c. of culture under the skin of the neck, 2 c.c. under the skin of the flank (left side). Immunity may be continued by renewed inoculations of 2 c.c.

It is superfluous to recommend all aseptic precautions in the application of the two first procedures.

(3) *Technique for Vaccination by Ingestion.*

(*a*) *First Vaccinal Ingestion.*—15 c.c. of the culture are deposited in the mouth on the sides of the tongue by fractions of 1 to 2 c.c., with the aid of a 20 c.c. syringe. After each partial injection the animal should be allowed to swallow at its ease.

(*b*) *Second Vaccinal Ingestion.*—20 c.c. of culture will be deposited in the mouth, following the same procedure. Immunity can be reinforced and continued by subcutaneous injections of 2 c.c.

PHENOMENA FOLLOWING VACCINAL INOCULATIONS.

There is one phenomenon common to all methods of vaccination. I refer to the temperature-raising effect of tuberculin injected under the skin. Animals which do not react before the first inoculation, react in a characteristic fashion a month after inoculation, a proof that they have undergone tuberculous infection. Consecutively this sensibility diminishes little by little in the greater part of the subjects, often it remains doubtful. It ascends after the

second vaccinal inoculation; nevertheless, the reaction is a little less strong than that following the first inoculation.

If one injects tuberculin into the vaccinated animals six or eight months after the second immunization, the reaction is very often negligible. It, however, produces successively in vaccinated animals some modifications which render them less and less apt to react to tuberculin. These phenomena unfold whilst the bacilli spread in the organism, and become destroyed there unostentatiously without creating perceptible lesions.

To these common phenomena may be added troubles peculiar to intravenous and subcutaneous vaccination. I shall not speak of immunization by ingestion, for its sequelæ pass unperceived.

In *intravenous vaccination* the first injection does not cause early general troubles. But towards the middle of the second week the temperature rises some tenths, it may reach and even pass 40° C. This hyperthermia is quite ephemeral, reappears sometimes in the subsequent weeks without the health appearing disturbed by it. The second injection is followed on the contrary by immediate disturbance. The subject becomes dull, has a staring coat, eats less, is sometimes slightly tympanitic, and at the end of the day the temperature rises to 40° C. and above; but it descends rapidly on the following days, and everything returns to the normal.

In *subcutaneous vaccination* there is immediately produced at the point of the first injection a slight diffuse œdema, which soon becomes circumscribed, less and less sensible, and finishes by being hard and bossellated to the touch.

As a general rule this tumefaction persists a very long time, always becoming reduced. If one incises it at the end of a year to eighteen months, one finds it composed of an envelope of sclerous connective tissue, in its centre some yellowish granulations, partially softened and of a purulent clotty material. This local accident never, however, tends to ulceration of the skin. One can, and must, leave it to itself, for it is probably the situation of an elaboration of vaccinal material. The corresponding lymphatic glands swell and become sensitive for some time, then retake their volume and normal consistence. The temperature hardly rises a few tenths. The general state is excellent.

The second immunization is followed generally by a local accident analogous to the preceding, at times a little less extensive. Usually the temperature rises during the first day, but the general state is not so accentuated as that which follows the second intravenous injection. Subsequently there can be no doubt that the animals have received

a dissemination of tubercle bacilli, and carry four foci in which some bacilli exhaust themselves.

Inquiry into the Results.

There are two ways of investigating the results of immunization :—

(1) One can content oneself with observing the vaccinated and control subjects clinically. One can see, for example, that several experimental subjects will present an abnormal temperature, and that certain of them will present symptoms of pulmonary tuberculosis. But many among them, after a very troubled period, return to a quite normal state at the end of the experiment. In fact, inoculation does not always produce a generalized or subacute tuberculosis, but limits itself to provoking a subacute or chronic pulmonary tuberculosis, or here and there circumscribed lesions, that is to say, what I will call a partial infection. The vaccinated animals will at times be as severely affected as the controls. The great majority appear, on the contrary, to bear up well clinically. In proclaiming from this sign the complete success of vaccination, one should not deceive oneself by calling the subcutaneous injection of tuberculin to one's aid. Examples have been recorded (by M. Lignières among others), and I myself have noted cases where the reaction to tuberculin was at fault, in spite of the presence of tuberculous foci of living bacilli in vaccinated animals submitted to the test.

(2) *Post-mortem* examination is the only means of strictly appreciating the degree of resistance communicated to young bovines by the processes of immunization. This examination ought to be made with the minutest care. Not only the viscera but all the lymphatic glands of the organism ought to be explored. The nature of doubtful lesions will be determined by histological study and bacteriological research (on the bacilli and inoculation).

I ought to make an important remark concerning the property of the bacilli, which I extol with the title of vaccines. When one immunizes with ordinary bacilli simply attenuated, the vaccines can produce lesions in which the bacilli preserve their vitality for a long time and become a menace to the subject submitted to immunization. In these cases there is cause to note the kind of lesion and the manner in which they preserve the vaccinating bacilli (so called). This care is not necessary with my vaccinating bacilli, for their pathogenic power is profoundly modified. Not only do they not provoke tubercles in the parenchymas in the doses indicated, but if one meets them still endowed with the power of growth in the

organism their presence will be negligible, and does not constitute a menace to the subject which carries them, any more than for other animals and man himself if these bacilli come in contact with them. Consequently, the lesions which may be found at the autopsy of animals submitted to my processes of vaccination may have been present before vaccination and may not have been revealed by previous testing, which is possible. I may add that I have never given great weight to this idea in my experience, but have kept it in view.

(3) Before passing to the appreciation of results I will dwell on some notable things brought to light in the course of autopsies.

I have encountered no lesions in the lungs following intravenous injection of bovine bacilli made on animals vaccinated by the subcutaneous method, but noted a tuberculous infiltration more or less considerable of the mediastinal glands only, or of the mediastinal and bronchial glands.

Why have the bacilli cleared the lungs without installing themselves there? Have they encountered cells endorsed with a strong enveloping power which carried them rapidly beyond the lung, or would have rapidly destroyed those enmeshed in the pulmonary network? I know not. Sometimes in this connection I recall a more or less analogous fact that I have previously noted. I have observed that tuberculous bacilli injected into the jugular vein are so much the less arrested in the lung the more they are attenuated. It is beyond the lung that the weak bacilli establish themselves, for example, in the liver and spleen.

Again, following a virulent inoculation in the cervical region, I have found no lesion in the corresponding sub-scapular gland, and yet encountered recent appearance of it in the mediastinal glands. This observation presents a problem on the mode of propagation of bacilli in the organism.

Habitually when one renews the subcutaneous inoculation test on the vaccinated subjects the second inoculation produces little local trouble, and does not infect the corresponding sub-scapular gland, whilst tuberculosis more or less accentuated of this gland is about the rule from the first inoculation.

It has appeared to me impossible to procure a resistance capable of extinguishing the local subcutaneous foci following the test. But, as a general rule, this resistance is sufficient to limit the lesions of the subscapular gland. However, it is remarkable to see the results attending the second inoculation miscarry.

It is not said that virulent bacilli employed in the test of vaccinated subjects cannot arrive, and even subsist, for a greater or longer time in glands exempt from macroscopic lesions. I have encountered bacilli inoculable to the guinea-pig three and even seven months after an inoculation at the neck in the apparently free sub-scapular gland; and also in the bronchial and mediastinal glands four months after a test by the venous way.

Is there any ground for doubt and unrest as regards vaccination? No. This fact shows that the system of vaccinated subjects is not endowed with a bacteriolytic power of very high degree, but, nevertheless, has a sufficient defensive quality to hinder these bacilli from producing anatomical phenomena, which are characteristic of them when they have been inoculated. It is this defensive power that enables a vaccinated subject to retain a tuberculous abscess at the site of a subcutaneous test injection without danger to the corresponding lymphatic glands. And this power manifests itself clearly in the bulk of our experiments.

Appreciation of the Results.

No more for antituberculous than for other hitherto known vaccinations should it be contended that it confers absolute immunity, nor do all the subjects submitted to vaccination offer a uniform resistance. The immunity produced artificially is relative. One can, however, foresee that it will be more or less insufficient if the subjects are exposed to a severe infection, be it by the nature and dose of the virus or be it by the track of infection. When it becomes insufficient one will measure to some extent its value by the number and importance of the tuberculous foci, of which it has not hindered the formation.

(1) I will consider firstly the result of our autopsies in their greatest simplicity.

Among vaccinated and test animals we shall distinguish :—

(*a*) Those whose necropsy has been macroscopically negative. (*b*) Those which have presented very circumscribed lesions, caseo-calcareous either in one or a few glands. (*c*) Those on which the test has determined an extensive tuberculosis, sometimes fatal. On the first, vaccination has given complete success; on the second, a relative success; on the third, failure.

I will also divide the controls into those which the trial has granted a *complete infection*, that is to say generalized, a *partial infection* localized in some glands (mesenteric or mediastinal, bronchial and retro-pharyngeal) of one or several systems, or has not determined appreciable infection to the eye and touch.

On these bases I will obtain the following table:—

(*A*) *Animals Immunized with Homogeneous Bovine Bacilli.*

		Per cent.
Vaccinated	Complete success	50
	Relative success	25
	Failure	25
Controls	Complete infection	63·6
	Partial infection	27·2
	No infection	9·2

(*B*) *Animals Immunized with Homogeneous Human Bacilli.*

		Per cent.
Vaccinated	Complete success	42·1
	Relative success	42·1
	Failure	15·8
Controls	Complete infection	12·5
	Partial infection	87·5
	No infection	0·0

It remains to be said, first, that 50 per cent. of the vaccinated of group *A* have escaped infection as against 9·2 per cent. of the control animals, and that 25 per cent. of the vaccinated have been severely infected as against 63·6 per cent. of the controls; second, that 42·1 per cent. of group *B* have resisted infection, when not one of the trial animals has escaped infection.

If one totalizes in each table, on the one hand, the complete and relative successes, and, on the other, the complete and partial infections, and if one set the numbers obtained in this way against each other, it will be perceived that in group A vaccination has been more or less efficacious for 75 per cent. of the subjects against an infection which has infected more or less 90 per cent. of the trial animals; that in group *B* the reports have the same meaning, since the percentages are 84·2 and 100.

(2) I will consider the results now in another way. I have said previously that inoculation of the test in the control animals and the vaccinated can cause partial infection. This taken altogether should be less in the vaccinated animals, or vaccination would have failed in its aim on several subjects. It is important, then, to estimate in all cases the degree of infection.

To arrive at this estimation I will put the sign + to extended infections, and even + + to some examples of particular generalization, and the symbol + followed by one or two signs — according as partial infection seems light or very light—I afterwards add in each group (*A* and *B*) all the signs + and all the signs — and I calculate the proportion of + to — obtained by the vaccinated and trial animals.

Thus I find that in group *A* (vaccination with bovine bacilli) the

lesions are this time more important in the controls than in the vaccinated, and in group *B* (vaccination with human bacilli) twice as important as in the controls.

Relative Value of Vaccines and Methods of Vaccination.

The last line of the preceding paragraph shows that human bacilli in homogeneous cultures immunize less efficaciously than bacilli of bovine origin.

I therefore accord the preference to bovine bacilli.

From the point of view of their comparative value, I find in my experiments that the procedure by intravenous injections comes first, then follows the procedure by ingestion, and finally, subcutaneous inoculations. This classification results from the collected experiments made with each procedure, for vaccinated subjects by each process have been tested by different modes of infection; intravenous injection, subcutaneous inoculation, ingestion.

Intravenous vaccination has procured 75 per cent. of complete successes, ingestion 50 per cent., subcutaneous inoculation 10 per cent. of complete successes, and 73 per cent. of partial successes. I advise, then, intravenous injection on very young calves up to the age of 3 or 4 months, for these animals are easily restrained and need little vaccinal culture.

One may reconfer immunity towards the end of the first year, and follow from year to year by the subcutaneous process which presents the minimum of difficulties.

Vaccination by the digestive tube requires much vaccine; it is inconvenient.

The subcutaneous method will be adopted in cases where the two others would be difficult of application; but it must be repeated to obtain a satisfactory result.

Duration of Immunization.

Bovo-vaccination has been reproached with protecting animals such a short time. From my experimental vaccinations I have established the persistance of immunity seven, ten, fourteen, and twenty-two months after the first inoculation. Of none can it be said that this duration is not sufficient.

It would be preferable if the immunization was definite. But where is the artificial immunization that lasts indefinitely? Besides, one will note that immunization may, perhaps, be reinforced by periodic and absolutely harmless subcutaneous inoculations.

REFLECTIONS.

The method of immunization that I have the honour to extol in this article does not exactly resemble any of those put forward up to to-day. All the known methods depend on the employment of attenuated tubercle bacilli. Also I have reason to congratulate myself on having established first the variability of tuberculous virus and of having for a long time defended it against the partisans of the exceptional immutability of the bacillus of Koch.

From this point of view mine differs from others. But the vaccines I employ are not composed of bacilli modified individually and extemporaneously whether by heat or antiseptics, or by a passage through the organisms of cold-blooded animals. Their active agents are living bacilli of bovine origin profoundly modified in their tubercle-producing power by a long series of cultures in the depth of glycerinated bouillon. The modifications which they have taken on are henceforth fixed and of such a kind that these bacilli form races indefinitely transmissible. These races, comparable to the anti-anthrax vaccines of Pasteur, can no longer cause tuberculosis of the viscera and glands under the conditions where I recommend them to be employed. Being without danger to the monkey I consider that they are also without danger for man. By their characters our vaccines are somewhat similar to the avirulent vaccines of Professor Klimmer, of Dresden.

In all cases I am absolutely certain that they cannot cause any fatal infection in the ox contrary to the bovo-vaccine (of von Behring), and the tauruman (of Koch-Schutz) which may comprise 7 to 8 out of 1,000 subjects vaccinated.

In these conditions I shall not hesitate to use them on a large scale.

I will not say that the phase of experimental researches is closed. I hope that in persevering in the studies of the laboratory one will perfect the methods and know better the conditions which follow the checks and those which guarantee success.

But such as they are to-day it would be negligent in my opinion not to profit by the results acquired to try and restrain the ravages of bovine tuberculosis by associating vaccination with ordinary prophylactic measures as one does for other contagious maladies.

MEANS OF CONTROL OF HORSES.

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I PROPOSE to deal in this paper with the means of control of horses, a subject of vital importance to every farmer.

Operations on or even local examinations of the various domesticated animals are often difficult or even impossible unless recourse be had to methods of restraint. An exceedingly numerous choice of methods is available, depending on the species of animal to be examined or on the operation to be performed.

This article will be confined to a short description of the ordinary methods which can be adopted in dealing with domesticated equines from a veterinary point of view. The control of wild, unhandled equines will not be dealt with, as that is hardly a subject for a veterinary surgeon, and, in any case, it is of too large a scope to be dealt with in an article of this kind. For this reason it is assumed, for the purposes of this article, that the animals have been handled, and are not wild or really intractable.

To begin with, the horse should be securely bridled or haltered, and held by a reliable man, who must give his whole attention to the animal, and be prepared to check at once any indication of restlessness, temper, uneasiness, or nervousness.

MANNER OF SECURING A HORSE.

The horse is the animal most frequently submitted to operation, and, owing to its strength and agility, and the readiness of its means of defence and attack, as well as its value, is perhaps the one which requires most skill, strength, and tact in securing for operation. The kind and multiplicity of means of restraint will generally depend upon the nature of the operation and the disposition or temperament of the horse.

STANDING POSITION.

The horse may be secured for operation by the head or limbs, or both.

The Head.—The head is usually secured by means of a head-collar, bridoon, bridle, or cavesson, and the auxiliary restraints are the gag, twitch, mask, blinkers or blinders, cradle, and side rod.

The employment of the first four does not demand further notice than that they should be of good material, and so attached they they will not readily slip off the head at a critical moment. When a bit is

worn in the mouth care must be taken that it does not injure the tongue or lower jaw.

A strong, active, and experienced groom should hold the horse by the head, standing in front, though a little to one side, to escape injury from the fore-feet. One hand may seize the reins or head-collar rope close to the head or under the chin; the other hand holding it near to the opposite end.

When the horse is to be secured by the head to a wall or similar resisting body, a strong leather head-collar, with one or two ropes, should be used, but a bit or rope should not be put in the mouth for fear of accident to the tongue or jaw. If the anterior part of the body is to be operated on, the head should be tied as low as possible; if the posterior, as high as convenient.

The gag is most readily formed by the rope of the halter or head-collar passed as a loop round the lower jaw, behind or in front of the canine teeth, and drawn tight. Another form of gag is made by a short piece of round wood 4 or 5 in. in diameter, with a leathern strap and buckle attached to the ends. This is placed high up across the mouth, and the strap buckled behind the ears, thus maintaining the jaws wide apart. A third form is the Polish gag, which is simply a long loop of rope placed in the mouth and behind the ears, and tightened by means of a long or short piece of stick twisted in it towards the cheek. This is a very potent mode of subjection.

The twitch is a severe instrument of control, and should not be used unless it is absolutely necessary. Generally speaking, it is far too frequently used, and is often applied to animals which would be more easily and more humanely managed by gentleness, patience, and tact. The ordinary twitch is merely a round piece of wood, from 1 to 5 ft. in length, and 1½ to 2 in. in diameter, with a hole at one end through which a piece of cord is passed and tied in a loop sufficiently large to allow the closed fist to pass through it easily. The loop is passed some distance over the upper lip, which is seized by the hand and drawn forward; the cord is then rapidly twisted by the other hand, or by an assistant, to the necessary degree, by the rotatory motion of the wooden handle. Most frequently it is applied to the upper lip, rarely to the lower, and even less frequently to the ear or lower jaw. It acts by severely compressing or squeezing the tissues, and produces such a degree of suffering as to attract the attention of the animal from the pain of the operation, and subdues it. The long twitch is held by an assistant, but for some operations, and particularly when there is not an assistant to spare, or when the horse

has to be thrown down, the short twitch is most useful. The handle of this is so short that it merely serves to twist the cord and remains without being held, or it may be attached to the cheek of the head-collar by a piece of twine or a small strap.

Blinding.—Sudden deprivation of sight often alarms the horse to such an extent that it is rendered docile, or at least more manageable, while, if it is really vicious, it cannot take advantage of a favourable opportunity to injure those around it. Sometimes, however, blind-folding does not produce tractability, but rather the reverse, and may lead to serious accidents from the horse dashing about recklessly. Any non-transparent covering will suffice to exclude vision—a handkerchief, towel, or piece of cloth tied across the face from one side of the head-stall to the other; a driving bridle with blinkers or the ordinary eye covers, known to veterinarians as "bluffs," or the mask or "blinders" will answer. The latter is the best, because, being made of leather, it acts as a guard to the eyes and eyebrows during the performance of the operation, particularly when the horse is placed in a recumbent position.

The cradle or beads allows lateral and downward movement of the head to only a very limited extent. It is composed of frc eight to twelve round pieces of wood, $1\frac{1}{4}$ to $1\frac{1}{3}$ in. in diameter, and 15 to 18 in. in length, pierced at each end by a hole, through which a cord passes. These rods are kept some inches apart from one another, either by knots on the cords or by short pieces of wood perforated from end to end, and strung on the cords between the rods. The ends of the cords are tied on the upper part of the neck, and to prevent this part being cut by them it is well to place a pad of tow or other soft material between them and the skin.

The side rod is a round wooden or iron rod from $3\frac{1}{2}$ to 4 ft. in length, with a thong or small strap and buckle at each end. One end is attached to the head collar, while the other is fastened to a surcingle firmly secured round the body. It is placed on the side opposite to that on which the operation is to be performed, and prevent bending of the neck laterally, and to some extent downwards.

In some operations on horses it is sufficient if the ears are grasped by a couple of powerful assistants and the head drawn forcibly downwards. This does not completely insure the operator's safety, but it checks attempts at rearing and striking with the front feet. This method of drawing down the head is certainly better than fastening the animal to a fixed object.

The Limbs.—It may be necessary to secure one or more limbs in

order to limit the movements of the horse as much as possible and prevent injury to the operator or attendants. One limb may be raised from the ground and maintained in a flexed position, or two or three limbs may be secured without elevation, or one may be raised and the others secured in addition. The flexed limb may be a fore or hind one, and may be maintained in that position by manual or mechanical means.

(*a*) *Fore Limb Flexed.*—The fore limb may be maintained in a flexed position manually by lifting it in the ordinary way, the assistant then standing upright and firm, his face towards the horse's hindquarters, and his hand grasping the toe of the hoof, the thumb at the toe of the shoe, and the fingers extending on the front of the wall, holding the limb well flexed, the foot towards the elbow. If it is a left fore limb, then it is held by the assistant's left hand, and *vice versa*. Strength, agility, and tact are necessary in manipulating the limbs, and in holding up a fore leg the assistant has often need of these qualities, and to a high degree. Attempts should not be made to prevent all motion in the flexed limb, and the hand should follow its swinging movements forwards and backwards, care being always observed in keeping the balance should the horse bound forwards.

To prevent injury and fatigue, or when an assistant is not available for this purpose, the mechanical method can be adopted. In this a rope or strap is employed to attach the pastern to the forearm. The leg is well flexed at the knee, and the rope or strap is then passed round the forearm and pastern, a complete turn being made, if necessary, for greater security, around the pastern. A leather strap with buckle is to be preferred, as it is easier applied and removed, and not so likely to injure the limb. To prevent contusion by the hoof, it may be necessary to interpose some soft substance between it and the elbow.

Another mechanical method is by the side-line. This is a long cord, or rather thin rope, or, better still, strong web band, about 20 ft. in length, with a loop or hobble strap at one end. The loop or strap is placed round the pastern of the limb to be raised, and the rope or band is passed over the horse's shoulder to the opposite side, where it is held by an assistant after the leg has been flexed, or it is passed in front of the chest, round again to the same pastern, where it is fixed, the weight and strain being thus thrown on the withers.

(*b*) *Hind Limb Flexed.*—The hind limb, like the fore one, may be flexed and maintained in that position manually or mechanically.

Manual flexion of the hind limb is more difficult and dangerous than that of the fore limb, owing to the powerful action of its flexor and extensor muscles and its wider range of movement. A strong farrier is the best assistant in maintaining this limb raised in a flexed position. The horse's leg (or shank) rests on the assistant's thigh, his limb corresponding to that of the horse—*i.e.*, right leg to right leg, and *vice versa*, his back being towards the horse's head. As with the fore limb, the assistant should stand as erect as possible, and not allow himself to be drawn beneath the horse or thrown down. The strain is much relieved, should the limb have to be held up for a considerable time, if he wears a cross or shoulder belt with a strap attached, which he passes round the pastern, holding the end firmly in one of his hands; or, if the horse's tail is very long, it may be passed round the pastern and held in the same way.

Mechanical flexion of the hind limb—that which is preferable, and in many instances is alone practicable—can be achieved in several ways. The first and simplest method, if the horse has a long tail, is to bend up the hairs into a large loop, pass a piece of rope half round this loop, and both ends through it, pulling them tight so as to close the loop. One end of the rope close to the tail has a loop or an iron ring spliced in it; the other end, being the longest, is passed completely round the pastern, the limb being raised and flexed backwards, or through the ring of the hobble if one be worn; then it is tied to the loop or ring at the short end of the rope. By this means the raised hind limb is secured as high as may be necessary to the tail, which bears the strain. It may be observed here that, unless a hind hobble-strap is used for the pastern, it is well to have a piece of flannel or cloth wrapped round it to prevent the skin from being contused or abraded—sometimes a rather troublesome accident when a sharp rope is employed.

The hind leg may be kept raised either forward or backward by means of a rope or the side-line already described. This can be employed in various ways:—

(1) Secured to the pastern by one end, the other end is passed through a body surcingle, and, being pulled by one or more assistants, the leg is drawn forwards and upwards; the rope is then tied to the surcingle or carried back through it and held there.

(2) After securing one end of the rope or side-line to the pastern, the other end is carried between the fore-legs, across the chest, and back behind the shoulder of the limb on the opposite side, over the back, and down towards the elbow on the same side as the limb to

be secured, where it is passed over the portion beneath the chest, and brought out again. By this mode the horse's back bears the strain.

(3) One end of the rope or side-line is tied round the base of the neck by a fixed knot; the rope is then passed backwards, outside the shoulder, to the pastern of the hind leg which is to be raised; if this has on a hobble strap, the rope is passed through the ring; if there is no strap, then the rope is carried inside the pastern, around it, and forward outside. Traction being now made, the leg may be lifted to the required height forward, and a turn of the free portion of the rope around the fixed part will fix it, one assistant being sufficient to control the movement of the limb. It may be noted that when it is at any time necessary to make a fixed knot in a rope which it is desirable should be readily untied, a small lock of hay or straw tied in the knot will facilitate this object; the straw being pulled out leaves the knot loosened.

(4) To flex the limb backwards, the rope or side-line is fastened round the neck and carried to and around the pastern in the manner just described. But instead of bringing it forward again, after the leg has been raised sufficiently high, one or two assistants pull the line backwards, and maintain the foot there. Another assistant, if the operation be on this foot, or even elsewhere, holds up the leg, thus steadying it, and supporting the horse at the same time.

(5) In order to throw the strain over a wider surface and limit the movements of the limb more effectually, the line is fastened round the neck, as in the two preceding methods, but, instead of passing downwards and backwards, the knot lies on the withers, the line directed along the back until it reaches the root of the tail; around this part it is passed, then brought down to the pastern of the leg to be raised. If a hobble-strap is worn, the ring side is turned to the rear, and the line passed through the ring, when, one or two assistants pulling, the foot may be sufficiently raised; passing the free portion once or twice round the fixed part secures it. If a hobble strap is not employed, then the limb should be raised, the line passed round the pastern, and held as described.

To prevent rearing and kicking during the performance of operations, the limbs are sometimes shackled by ropes or hobbles so that they cannot be raised to any distance independently. To prevent kicking, a hobble or shackle may be placed on each hind pastern, and a rope (the rope and chain of the ordinary hobbles do very well) is attached to both, but so as to leave a space between the hind feet. The rope is then passed between the fore legs, over the shoulder,

across the back, and round the fixed portion of the line, as in the second method.

The hind legs may be restrained and the fore ones limited in their movements by another method. This consists in using two side-lines, one for each. These are attached to the hind pasterns, passed between the fore legs, round the forearms, and underneath and within the fixed portion, and are tied over the back immediately behind the shoulders. The lines may be crossed in such a manner that the one on the left pastern goes to the right forearm and that on the right to the left forearm.

Another method is adopted by Legoff. The apparatus is very simple, and consists of a hempen rope the usual thickness of the side-line rope, the total length of which is that between the hind and fore limbs of a large-sized horse. It is single at one end and double at the other—Y shaped—each of the three extremities being provided with a running noose or loop. If it is desired to operate on the posterior part of the body, the loops of the double end are placed one on each hind pastern, the loop of the single end on the pastern of one of the fore limbs. If the anterior part of the body is to be operated on, then the double loop end is placed on the front pasterns, and the single one on a hind pastern. If the rope is too long for a small-sized horse, then the bifurcated portions may be twisted round each other as many times as may be necessary to make it sufficiently short.

For dangerous horses a very useful apparatus is the hippo lasso. It may either prepare the way for using hobbles or may even supersede them altogether. It consists of a front and hind portion hung by broad straps which pass across the back just behind the forearm and in front of the stifle-joint respectively, and held together by two other straps fastened to the front and running through rings in the back portion. By pulling on these straps the animal's fore and hind limbs are drawn together, and is effectually prevented from kicking either with the fore or hind legs. Many horses when thus secured lie down without struggling.

Recumbent Position.

For the carrying out of important surgical operations, horses are usually thrown down and secured. There are various ways of throwing the horse. I shall describe three of them.

(1) The side-line method. Special throwing harness is made for this purpose; lacking these, one may use a piece of ¾-in. rope. 40 ft. long, doubled at the centre, and tied to make a loop at that point about

2 ft. long. This loop can be slipped over the horse's head in the form of a collar, the knot coming at the top of the neck. The ropes are then brought down one on either side of the horse, each passed under the fetlock joint of a hind leg, and the end run forward through the collar. Assistants, by taking hold of these ropes while the horse is backed, can draw his legs well forward and up on his sides. When the horse is down the feet can be tied in this position with the rope.

(2) The hobble method consists in putting a strap or hobble around each leg just below the fetlock joint. A rope or a chain is then passed through a ring in each hobble, and all four feet are drawn together in a bunch, causing the horse to lose his balance and fall This method should be used on all horses over nine or ten years of age, as by the use of side lines they are likely to injure their heads by struggling. The side-line method is excellent for throwing young horses, especially for castrating, as the hind legs are drawn well forward and out of the way.

(3) A third method of throwing the horse consists in taking up one fore leg, usually the right, or "off" one, by a strap, which is passed either over the animal's back or under his belly, and held by the operator, who stands by the left ("nigh") foreshoulder. The operator holds up the foot with the right hand, at the same time drawing the horse's head around toward the left and pushing against its left shoulder. This throws the horse on his right side. At once the operator should get on the side of his neck, close to the horse's head. This keeps him down, for horses get up on their fore legs first, and it is necessary for them to throw their heads upward in order to get their balance.

In throwing horses, a spot of level greensward should be selected, or the floor or ground be well covered with straw to avoid injury as the animal goes down. It is a good plan to place a folded blanket under the horse's head to prevent injury to him while down. In working about horses an operator is liable to be hurt either by the animal's kicking, biting, or striking with the fore foot. The safest place by a horse when he is standing is close to the left shoulder, as the horse is unable to kick or strike a person there, and the head can be kept away by holding with the right hand. A person should stay close to a horse, or else keep quite out of his reach. A medium distance is dangerous ground.—*Transvaal Agricultural Journal.*

Indexed By...

RESOLUTIONS OF THE NINTH INTERNATIONAL VETERINARY CONGRESS AT THE HAGUE, SEPTEMBER 13-19, 1909.

A. GENERAL MEETINGS.

Government efforts against swine plague and hog cholera (swine fever) based upon the recent researches regarding their etiology, vaccination, serovaccination, &c.

(1) Hog cholera and swine plague are in reality two different diseases, and as they are also different in regard to their infectivity, they must be dealt with differently from the point of view of veterinary police.

(2) Hog cholera, which is caused by a filtrable virus, is a dangerous contagious disease, without considering the nature of the secondary infections, and it must be combated everywhere in uniform methods and with all possible means, on account of the great economical losses it gives rise to.

In regions where the disease is not common, and where it occurs only occasionally from time to time, compulsory killing of all infected animals, and of those which are suspected, is recommendable. Suitable compensation should be given to the owners.

In heavily-infected districts, where there are large numbers of swine, the disease must be repressed by a most severe application of the usual measures of sanitary police, employed against contagious diseases of animals.

In this struggle preventive inoculation with the blood-serum of hyperimmunized hogs, applied to herds which are already infected, may be regarded as a measure that can considerably reduce the mortality. Mediately it gives rise to an active immunity. This method has rendered important services; moreover, the result of recent researches leads to the hope that active immunization of non-infected herds may prove a powerful method of prevention. Therefore the study of preventive inoculation deserves to be strongly promoted by governments.

(3) To prevent and repress swine plague, which is usually spread by sick animals, less rigorous measures than those employed against swine fever will be sufficient.

(4) To prevent swine fever and swine plague by measures of sanitary police, the first conditions are that the herds of sick swine are detected by the compulsory report of disease, and that control of trade movement of swine be introduced. An important help would be

given to these measures by the introduction of the obligatory inspection of meat, and a regulation that all dead pigs should be brought to flaying-houses for examination before being disposed of.

(5) In addition to police measures, owners should be induced, by proper instruction, to take measures on their own account to prevent the introduction of hog cholera and swine plague, and to do all they can to conquer those diseases.

These measures are:—

Quarantining of newly purchased animals before they are brought into contact with other swine, hygienic treatment of swine, killing of diseased animals, regular disinfection of the stables, and, especially with regard to hog cholera, preventive inoculation.

The protection of the practice of veterinary medicine.

The laws and provisions existing at the present time are not everywhere sufficient to protect the practice of veterinary medicine; in order to obtain effectual protection in those countries where it has not yet been realized, special legal provisions should certainly be made.

The rôle of the veterinary surgeon as expert in zootechnical questions.

The Congress sees in the appointment of veterinary surgeons as official experts in zootechnical matters a powerful factor for the advancement of the breeding of domesticated animals. The Congress strongly recommends governments to entrust matters concerning the breeding and rearing of domesticated animals to veterinary surgeons.

The conditions necessary to obtain the doctorate in veterinary science.

(1) The Congress considers indispensable for the complete academic development of the veterinary studies that the degree of doctor of veterinary medicine should be made accessible to veterinary surgeons.

(2) Only independent superior veterinary schools and veterinary faculties having all the rights of faculties existing in universities or superior schools, organized in various departments, ought to be recognized as being competent to confer the degree of doctor.

(3) The conditions under which the degree can be conferred ought to be analogous to those demanded for the doctorate of other scientific departments.

(4) It is desirable that the obtention of the degree of doctor should be made also accessible for veterinary surgeons who have obtained their diploma previous to the establishment of university studies for veterinary medicine.

(5) The Congress brings a vote of thanks to Austria and to Hungary for having created the possibility of obtaining the degree of doctor of veterinary science at the superior veterinary schools.

The sanitary control of milk and the obligatory systematic inspection of meat.

(*a*) *Meat Inspection.*

(1) With reference to the conclusions, proposed by the Obermedizinalrat Professor Dr. Edelmann, Dresden, in correspondence with the conclusions proposed by the other reporters, and passed in the sense of the discussions, the Congress insists once more on the high signification of obligatory meat inspection for public health and sanitary police.

(2) The Permanent Committee of the International Veterinary Congresses is requested to inform the Governments of such States as have not yet introduced obligatory inspection of meat of the resolution of the Congress.

Conclusions of Mr. Edelmann and of the Other Reporters.

(1) The principal object of the obligatory inspection of meat instituted by the State is to protect human health from the dangers threatening by the use of meat.

(2) This inspection must extend in the first place to the animals usually killed for consumption in the country, except rabbits and fowls.

Whether fresh or prepared, the meat imported into a country must also be inspected.

(3) Only veterinary surgeons are designated by their technical knowledge to have charge of the inspection of meat and of the control of meat products.

Inspection by other persons than veterinary surgeons (laymen, empirics) ought not to be allowed, or only by reducing their use as much as possible, and whenever the services of a veterinary surgeon would involve complications or expenses beyond the object in view.

(4) It is in the interest of the inspection to be what it should and could be, to give the technical inspectors a proper social position, with corresponding remuneration.

(5) The practice of obligatory inspection of meat in the name of the State means examination of the animals before and after slaughtering (inspection of the animals and of the meat).

The exemption for animals killed for private use is not without presenting some dangers from the hygienic point of view. If, how-

ever, this exemption is accorded, it must never be for animals killed on account of their being sick.

(6) Inspection ought not to be abandoned in relation to trichinosis, where its presence in pigs, boars, and dogs, and the fact that all the trichinæ contained in the meat are not rendered harmless with certainty by the preparation that this meat undergoes in order to serve for human consumption, is to be taken into consideration.

(7) For the inspection to be complete and deserving as much confidence as possible, resorting to any method that has proved to be good cannot be neglected; especially for the discovery of harmful micro-organisms bacteriological examination is indispensable.

(8) In establishing the principles upon which inspection of meat shall be regulated, it is necessary to take always into consideration the positive results obtained by scientific researches, and, in case there is no objection with regard to sanitary reasons, to apply them as liberally as possible.

(9) The division of meat into good, conditionally good, inferior, and bad meat is practically to be applied.

Whether it is necessary to make the distinction of inferior meat depends upon what is required by the consumers.

(10) Bad meat must be disposed of in such a manner that in no way the germs of disease can be propagated.

(11) The utilization of conditionally good meat and, if necessary, of inferior meat, ought to take place only in the town of slaughtering or in a region as small as possible, and under police control.

(12) Obligatory inspection of meat in a State ought to be placed under a central direction. Experience has demonstrated the necessity of an efficacious control of the inspectors, especially of those who are not veterinary surgeons.

(13) Regular statistics, made up by the inspectors by daily annotations, are economically and scientifically of great value.

(14) It is recommendable to extend the examination to other animal food, especially game, fowls, fish, crustaceous animals, and molluscs.

(15) It will be good to complete the official obligatory inspection of meat by a control, made by veterinary surgeons and police officers, of the trade in meat in markets as well as in slaughter-houses and manufactories of meat products.

(16) One cannot insist too much on the great importance of official abattoirs with regard to general hygiene and the examination of meat. In larger towns municipal abattoirs should be erected. For smaller towns the erection of joint abattoirs is to be recommended.

Veterinary surgeons have proved themselves excellent directors of official abattoirs.

(17) In so far as the hygiene of meat is no special branch of examination for veterinary surgeons, it should be introduced.

To be admitted to the governmental examination (for veterinary surgeon) a certificate of having had an abattoir practice of at least a few months, for being appointed director of an abattoir one of having had a practice of at least one year, is required.

(18) It is desirable that the teaching relating to the hygiene of meat should be made more thorough in veterinary superior schools, and at the same time it would be necessary that veterinary students should have more opportunities of becoming familiarized with the technique and construction of abattoirs.

(*b*) *Control of Milk.*

(1) The regulation of the control of milk and milk transport is urgently required.

(2) The control must consist in :—

(*a*) A control of the stables (examination of the state of health of the animals, of the food and treatment of the milk cows), and

(*b*) A market control (examination of the milk brought to market).

(3) The stable control and the sanitary market control (examination with regard to alteration of milk, to sale of colostrum milk, to pathogenic milk germs, &c.) belong, of course, to the task of the veterinary surgeon.

(4) Stating adulteration by the addition of water, the removal of cream, and the presence of substances for conserving the milk, must be left to an expert with chemical training.

(5) Milk that is offered for sale as milk of superior quality should answer to special requirements.

The methods employed in treating the carcases and meat with the object of rendering them harmless.

(1) Flaying houses should be regulated by law and placed under governmental control, with compulsory confiscation of the dead and other animals that must be rendered harmless. Certain standard should be introduced with regard to the smallest size of the animals.

(2) The harmless destruction of carcases and confiscated meat may only be done by combustion or in special apparatuses heated by steam.

(3) For large abattoirs and flaying-houses with apparatuses for destroying carcases a system is to be chosen that with a minimum of expenses and simple manipulation assures complete sterilization of the carcases in such a way that the matter introduced leaves the apparatus in a finished state as a final product, and that the obtaining of valuable products is secured.

The prophylaxis and pathology of protozoan diseases.

(1) The Congress votes once more the resolutions formulated at the Congress at Budapest, and impresses upon the governments which have not yet organized a veterinary service the necessity of doing so with as little delay as possible.

(2) It is necessary for the struggle against contagious diseases in the Colonies that all governments concerned should materially encourage the study of the tropical ones. Since the etiology of a disease forms the basis of all sanitary measures, it is desirable that, as soon as possible, veterinary investigators should be sent into territories where diseases which have not yet been investigated are prevalent for the purpose of making a study of them.

The results of these investigations being of a common interest, both from the scientific point of view as well as from that of State veterinary medicine, they should be communicated to all governments concerned.

(3) For the purpose of carrying out the above proposals there should be established an international bureau of tropical diseases of animals, consisting of veterinary representatives from all the countries concerned. This bureau, amongst other things, should publish a bulletin giving the results of all recent researches dealing with tropical diseases of animals.

The governmental control of sera and bacterial products and their preparation by government.

The Congress esteems the governmental control of the sera and bacterial products necessary in those countries where the preparation of the same is not undertaken by the State.

Avian tuberculosis in its relations to tuberculosis in mammalia.

The avian tubercle bacillus being, in some cases, capable of infecting mammalia, it stands to reason that, with regard to avian tuberculosis, the same preventive measures should be applied as are taken against tuberculous meat.

The sterility of cows and its dependence upon the infectious diseases of the genital organs.

(1) With the view of determining more exactly the causes and results of contagious vaginitis a system of collecting statistics in the different countries ought to be established.

(2) In order to advance the study of the pathology and the treatment of diseases of the genital organs of the female domesticated animals, and, by doing so, to contribute to the national wealth, to the improvement of science, and to the well-deserved position of the veterinary surgeons, it is necessary to introduce into the curriculum of the veterinary schools a course dealing with the examination of the genital organs of bovines.

(3) It is also of urgent importance to establish research stations for the purpose of determining by clinical and experimental observation the influence of diseases of the genital organs on the fecundity of bovine animals.

Governmental efforts against tuberculosis, with regard to the ways of infection in this disease.

(1) Effectually to prevent the further spread of bovine tuberculosis and to conquor the disease, gradually but certainly, governmental measures are wanted.

(2) The governmental measures must extend to all open forms of this disease, and in the first place to open tuberculosis of the lungs and to tuberculosis of the udder; secondly, to tuberculosis of the uterus, the bowels, and the kidneys.

(3) For the forms of tuberculosis mentioned under (2) compulsory notifying report must be introduced.

(4) Animals suffering from open tuberculosis are to be killed immediately; the owners must be indemnified. The stables of these animals and their immediate surroundings must be disinfected.

(5) To prevent tuberculosis being spread by the milk residues of the dairy farms, sufficient sterilization of the skimmed milk, buttermilk, and whey, before they are used as food for animals, must be recommended, and also the destruction of the centrifuge rests.

(6) Besides the governmental measures against open tuberculosis of cattle, extensive voluntary measures to repress tuberculosis, protected by Government, ought to be recommended to the owners, and their general application encouraged with the help of the State.

(7) To secure a uniform execution of governmental measures against tuberculosis and to promote essential private measures a

central institute for the struggle against tuberculosis should be established in all countries.

(8) The obtaining of tuberculin for veterinary purposes is to be controlled by the State. In every case tuberculin should only be given to medical men and veterinary surgeons.

(9) The next Congress should treat measures to be taken against breeding cattle reacting on tuberculin, from the point of view of international traffic.

(10) The Congress invites the Permanent Committee of the International Veterinary Congresses to study the opportunity of an international committee for combating the tuberculosis of cattle, and, if possible, to formulate a proposal for the next Congress.

B. MEETINGS OF THE SECTIONS.

First Section: Public Veterinary Medicine; Control of Food.

Inspection of fish, game, poultry, crustaceous animals and molluscs, and of other animal foods, not included at the general meetings, in relation to the hygiene of man.

I.

(1) The control must comprehend all animal foods.

(2) Endeavours should be made that in all countries the laws concerning foods should contain provisions to the effect that all controllers are to have an unrestricted right of officially acting likewise in those places where victuals are manufactured.

(3) It is desirable that not only in towns, but, if possible, also in the country, regular control of food be introduced in order to give the greatest possible number of inhabitants the requisite protection of sanitary and material interests.

(4) The best means of solving this question would be the association of smaller communities to districts, each of which should build its own abattoir and entrust the veterinary surgeon of this abattoir with the control of all the vituals of the district.

(5) Where this should prove unpractical, governments should try to induce the communities to apply to the nearest veterinary surgeon —for preference the surgeon of an abattoir—to undertake the functions of controller of foods.

(6) To obtain the necessary veterinary surgeons also in small communities, it is recommended to support the erection of abattoirs exploited by societies, but under veterinary direction.

II.

The Congress, considering that an inspection of the banks of oysters and other alimentary molluscs is neither possible nor useful, expresses the desire that all places where molluscs are consumed be placed under the control of the hygienic offices and provided with basins of purification for storing the molluscs before they are brought to market.

III.

(1) On account of the diseases which have been the result to men from the use of game, fowls, fish, molluscs, crustaceous animals, and other animal products, it is necessary that an official control should vouch for their wholesome condition.

It is possible to carry out the sanitary inspection of these products without seriously prejudicing trade.

On account of the special knowledge that is required from the experts charged with these examinations, the control of these products cannot be realized in a scientific manner except by veterinary surgeons.

(2) The laws and regulations relating to the inspection of meat must provide for the control of game, fowls, fish, molluscs, crustaceous animals, and other animal products, and mention the various alterations which require total or partial confiscation or sterilization.

Animal products imported from foreign countries ought to be submitted to inspection by frontier veterinary surgeons at the moment of their introduction.

It is necessary that abattoirs for rabbits and killing-places for game, fowls, fish, molluscs, and crustaceous animals, as well as the factories of conserves proceeding from these animals, should be submitted to regular inspection.

(3) The introduction of animal products into cities ought to be regulated in such a way that they be directed, as soon as possible after their arrival, towards a centre of veterinary inspection having a bacteriological laboratory. It is indispensible that in large cities several veterinary surgeons be specially appointed for this control. This first inspection is to be completed by visits of inspection to the markets and to the shops of dealers.

IV.

(1) On behalf of the veterinary control of the fish market, it is to be recommended that the courses about the knowledge of fish,

hitherto held separately, be united to one by creating a lectureship on the knowledge of fish at the veterinary schools.

(2) At all veterinary superior schools lectureships should be created for the encyclopædia of the knowledge of fish, where the principles of anatomy, physiology, systematic pathology, and fish culture is to be taught in a compressed form.

(3) The subject should likewise be added to the programme of examination.

Insurance of stock in relation to obligatory meat inspection.

(1) It is desirable that in all countries insurance should be introduced, both in the interest of the meat inspection, the execution of which being thereby much facilitated, and in that of the farmers and butchers.

(2) In so far as the insurance of cattle is not undertaken by the authorities, these should, by distributing model statutes, induce the communities, agricultural corporations, as well as societies of butchers and cattle merchants, to constitute companies for the insurance of cattle, founded on the basis of reciprocity.

Disinfection of the vehicles of transport and animal products in international traffic.

(1) The transport of cattle and animal products which can cause danger of infection ought only to take place (by rail) in vans which have been especially appointed for that purpose and can be easily distinguished from other vans.

(2) After each transport of cattle or the above-mentioned animal products, the means of conveyance must be disinfected, and the most convenient places for doing so are, in the case of railways, the central points, and for ships the unloading places.

(3) The regular destruction of excrements, collected when loading or unloading, must be assured; the best means of destruction is by combustion.

(4) The disinfection of loading and unloading places and of the different objects used for doing so, must be strictly attended to; the ground must be arranged in such a way that this disinfection is practically possible.

(5) After loading and unloading cattle, vans must be provided with a mark which, after the disinfection, will be replaced by another to indicate that the carriage may again be used for transport; the construction must be such that disinfection, if desired, can be accomplished by means of gaseous disinfectants.

(6) After unloading cattle vans must be sealed if the disinfection is not performed at the place of debarkation.

(7) All the above-mentioned formalities must be done under the direct supervision of Government veterinary surgeons.

(8) It is desirable that various countries between which an important and extensive traffic is carried on—countries like Russia and Spain, with special rail-guages, excepted—make contracts which will guarantee that the measures indicated by the above-mentioned resolutions are carried into execution.

(9) An International Commission shall be charged to define the best method of disinfection of wagons and to examine the best method of disinfecting the animal products before their forwarding, or before their unloading for the national traffic.

Serotherapy, seroprophylaxis, and vaccination of foot-and-mouth disease, and their value from the point of legal sanitary police.

(1) It is possible to prepare an active serum against foot-and-mouth disease.

(2) Its use, in combination with other sanitary measures, can become an efficacious means for the combating of the disease.

(3) The preparation of an active serum is to be assured by State institutes which guarantee against the spread of the disease.

SECOND SECTION: PATHOLOGY AND BACTERIOLOGY.

The diagnosis of infectious diseases by means of the recently-discovered reactions of immunity (except the subcutaneous injection of tuberculin and mallein).

(1) Reactions of immunity have a great value for the diagnosis of infectious diseases.

(2) A continuation of the comparative study of the various reactions is recommendable in order to assure more completely its practical application.

Vaccination against tuberculosis.

(1) At the present time there is no vaccination which in itself is sufficient to combat in an efficient manner bovine tuberculosis in heavily-infected herds.

(2) In how far it is possible to bring about a more successful issue of the difficult struggle against bovine tuberculosis by a combination of vaccination with prophylactic and hygienic measures must be demonstrated by new practical experiments.

(3) The Congress urgently requests the governments to grant also

in future the means for extensive experiments to examine the methods of vaccination against bovine tuberculosis under the different conditions of agricultural practice.

Anatomo- and histo-pathological diagnosis of rabies.

(1) Autopsy may often reveal alterations which point in all probability towards rabies.

(2) The detection of Negri bodies is to-day the most accurate method of diagnosing rabies, animal inoculations excepted. If such bodies, with characteristic structure, are found within unaltered or almost normal ganglion cells, the diagnosis of rabies is justified.

(3) In case Negri bodies are not found, or conditions make it impossible to look for them, the diagnosis of rabies may be made with much probability by finding the lesions in the cerebro-spinal ganglia, described by Van Gehuchen and Nélis, or the rabious nodules and the infiltrations about the walls of the blood-vessels of the medulla oblongata found by Babes.

(4) If the histological examination leaves any doubt as to the diagnosis of rabies inoculations must be made.

THIRD SECTION: PRACTICAL VETERINARY MEDICINE.

Infectious pleuro-pneumonia of horses.

(1) Infectious pleuro-pneumonia of the horse is a contagious disease confined to the horse, which should be clearly distinguished from other similar diseases, especially from typhoid fever. It is characterized by an acute, infectious, fibrinous inflammation of the lung and the pleura, with alterations in other organs.

(2) The etiology of infectious pleuro-pneumonia of the horse and other similar diseases is not yet cleared, and, as the researches on the subject demand great expenses, it is necessary that the governments of those countries in which the disease is prevalent should encourage and financially assist them.

(3) It is desirable that infectious pleuro-pneumonia in the horse should be combated with official measures of sanitary police.

Chronic deforming arthritis of horses.

(1) Prophylaxis of chronic deforming arthritis of horses must occupy itself with the species:—

(*a*) By removing from the breeding studs all such animals as are predisposed on account of their constitution;

(*b*) By giving methodical and systematical detailed reports

about the state of health, the individual peculiarities, and those of the family of the brood animals;

(*c*) By trusting only veterinary zootechnical specialists with the operations in the breeding establishments.

(2) This prophylaxis must convince the societies of horse-sport and the administration of studs that it is necessary:—

(*a*) To arrest the progress of the intensive exploitation by retarding the work of brood stock in such a way that they are never set to work before their second year is completed;

(*b*) By giving only slight exercise to colts of both sexes, and to reserve the heavier work for stallions and mares till they are three years old, whilst at the age of two years they have only taken part in slight training exercises;

(*c*) By introducing in general fundamental trials of resistance under an average weight in preference to those of excessive rapidity under a small weight.

FOURTH SECTION: ZOOTECHNY AND VETERINARY HYGIENE.

Physiology of milk secretion; relation between the external form of cows and the production of milk.

It is to be recommended that the researches by veterinary surgeons concerning the relations existing between the external form of cows and milk production, or, better still, the relations between the external form, the health and the milk production, be continued.

It is desirable that the unity in the methods of examination and in the interpretation of the results be augmented.

It is desirable that a report expressing practical wishes in this regard be prepared for the zootechnical section of the next Congress.

Teaching of zootechny.

(1) It is necessary that at veterinary schools extensive lectures on zootechny be given.

(2) Very serious examinations should be held on this point.

(3) The next Congress will treat in one of its sections the following questions:—

What is the influence of heredity in the early development of affections which stunt the economical usefulness of horses? What are the manifestations of this heredity that should be avoided in regard to breeding animals?

Clinical Articles.

A CASE OF VALVULAR DISEASE WITH DILATATION.

By MAJOR W. R. WALKER, A.V.C.

St. John's Wood Barracks.

The subject was a black gelding, aged 8, belonging to "B B" Battery, R.H.A. This horse had always performed its work well, and had never before been on the sick list. On the morning of May 25 it was noticed to be lying down, apparently quite comfortable, but when it was time for it to join the other horses at morning exercise it was found to be unable to rise without assistance. It was taken with difficulty to a loose box, and fell on the way. When it reached the box it lay down immediately. The pulse was almost imperceptible, and respiration difficult; temperature 101° F.; mucous membrane dark in colour. After laying quietly for about an hour, it struggled slightly and died.

The *post-mortem* appearances were as follows: The heart was hypertrophied with excessive dilatation, especially on the right side; the right auricle was twice the normal size, and its walls flabby and very easily torn or pierced by the finger; both the tricuspid and bicuspid valves were much thickened and puckered. This condition was most marked in the tricuspid valves. The ventricles contained clotted blood. The heart, when washed and cleaned, weighed 10 lb. From its appearance I expected it to weigh heavier, but the dilatation was more marked than the hypertrophy.

The lungs contained dark-coloured blood, which changed to a bright colour on exposure to the air, otherwise healthy. Other organs healthy.

BOTRYOMYCOSIS FOLLOWING CASTRATION IN THE PIG.

By B. FRACARO.

Five pigs, two males and three females, castrated at the age of 2 months, presented a tumefaction at the level of the operation wounds twenty days after operation. In the hogs there was an endoscrotal tumour, the size of one's fist, hot and painful, which one could follow by palpation up to the inguinal ring. In the "mins" (or females) the tumefaction situated at the level of the left flank was less pronounced, but it extended towards the bottom of the abdomen, or seemed to be continued across the wall of the flank into the

abdominal cavity. In all the pigs the wound was fistulous, and gave discharge to some granular fœtid pus. The tumours were removed surgically; examination of them showed that they were botryomycotic in nature.

(*La Clinica Veterinaria.*)

COMPOUND FRACTURE OF THE NASAL BONE IN A HORSE.[1]

By PROFESSOR W. C. SCHIMMELL.

A MARE, aged 3, ran against a wall and was badly wounded about the head.

On examination there was a V-shaped wound on the nasal ridge; the lap of skin forming the edges of the wound hung down so that a triangular surface of the roof of the nose was laid bare. The nasal bones were fractured and depressed from the median line inwards. The impression extended below to the base of the wound, where the skin was separated from the bony wall and a pocket-shaped cavity had arisen. On movement the horse showed dyspnœa.

After removal of a splinter of bone, reposition of the pieces of bone was effected, the fold of the skin turned up, and the edges of the wound united by button sutures.

After the operation the horse was turned round in the stall and put in pillar reins.

The wound was syringed out daily with 1 per cent. sublimate solution. On the third day the discharge from the nasal openings and skin wound was not purulent, but on the following day it was. For better removal of pus two of the sutures on the left side were removed and exercise for half an hour daily ordered. The temperature was 38·6° C. On the eighth day it was 39° C., and the horse was turned out to pasture near the clinic. There, after the twelfth day, the discharge gradually declined and the temperature sank to normal. A strip of dead skin at the edges of the wound, about the breadth of one's finger, was removed after the sutures had been taken out. After nineteen days' treatment healing had so far advanced that the horse could be discharged.

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[1] From the Reports of the Surgical Clinique of the Imperial Veterinary School at Utrecht.

Canine Clinical Notes.

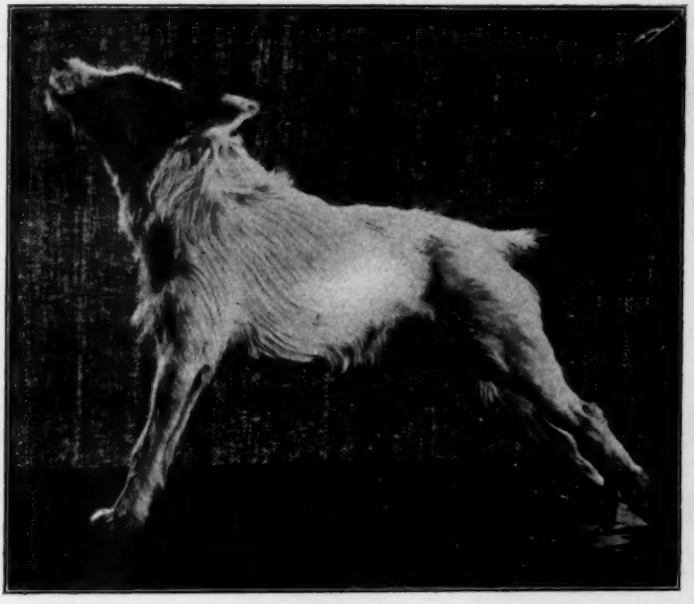
Indexed B. A. I.

TETANUS IN THE DOG.

By J. STEWART WOOD, M.R.C.V.S.

Parkstone.

WELL-MARKED cases of tetanus in the dog are in my experience extremely rare, but probably many cases of stiffness in muscles and joints that are attributed to rheumatism or chill are in reality due to tetanus, although the symptoms are not acute enough to establish that diagnosis.



Tetanus in the Dog.

In the case recorded the symptoms were so distinctive as to leave no room for doubt. The patient, a male fox terrier, about eight years old, was brought to me on May 2 for the purpose of having a dog tick (*Ixodes ricinus*) removed from his back; it was situated above the spine just behind the shoulder blades. This was done after saturation with spirits of turpentine, and I suggest that the small wound made by the attachment of the tick was the seat of the inoculation, the dog being noticed to roll in the garden on his return. I was next asked

to see the dog on May 14. I was told that he had been gradually getting stiff for some days. I found him showing undoubted signs of tetanus; he was very stiff and could only just walk, frequently tumbling over. The head was elevated, the spine depressed, the legs stretched out, the position being typical of that known as *Opisthotonos*. The animal could lap milk, but with difficulty; the temperature was slightly subnormal, 99° F.; and the breathing was shallow, but regular.

The next day the conditions were aggravated, with the exception of power to turn the neck slightly. The dog was as if carved out of stone—when stood up he remained standing, if carefully balanced, when recumbent he remained immovable—like a toy dog that had been knocked over. There was no excitement apparent; he was too stiff to show it if present. When stimulated by a noise or touch, the left hind leg moved a little, and that was all. Trismus was now completely established.

As an experiment, I put the dog under chloroform; he took it quietly. Under its influence the tenseness of the muscles gradually relaxed—the anterior part of the body first, the posterior some minute and a half later. When thoroughly under the chloroform the dog became quite limp. I took the opportunity of passing the catheter, emptying the bowels, and feeding him through a tube. He was then well massaged. After removing the chloroform the dog gradually became stiff again.

He died quietly on the morning of the 16th. The photograph was taken soon after death, and shows his position very well.

I would draw attention to the fact that trismus was the last condition to be established. In another case in the dog that I have seen the position was that known as *Tetanus lateralis*. The dog could eat freely, although his body was bent as a bow.

SARCOMA OF THE FEMUR IN A MASTIFF.

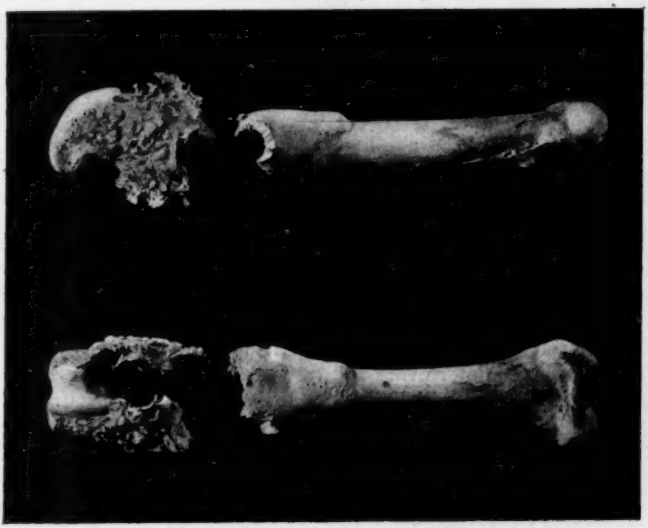
By GEORGE H. WOOLDRIDGE, F.R.C.V.S., M.R.I.A.

Professor in the Royal Veterinary College, London.

The subject of this note was a large male brindle mastiff, aged 7. For the last four years he had been in the possession of Mr. W.

He was first brought to the College clinique on October 13, 1909, suffering from acute lameness of one hind limb. The only history of any previous illness was that in 1907 he was often disinclined to walk

any distance, and was constantly lying down. He recovered from this apparently debilitated condition, with occasional short relapses, but there was no indication of any localized trouble. Worm medicine was administered with successful results, and it was concluded that his lassitude was probably due to worms. He was first noticed to limp slightly about the end of August; but the lameness wore off with exercise. As the weather was very damp about that time, the owner thought it was rheumatism. During September the lameness increased, and he frequently licked his quarter, indicating the seat of some pain



Femur after maceration.

or irritation. The owner applied fomentation and embrocation, which gave no relief, and up to this time no local swelling was observable. About the end of September pain was localized just about the stifle joint, and on October 9 for the first time a swelling was felt.

On being brought to me on October 13 I examined him, and found an enlargement of the junction of the middle and lower thirds of the femur. It was fairly tense and quite painful. My diagnosis was ostitis, but I was unable to suggest the nature of the cause. Iodine liniments were prescribed locally, but the lameness and pain so con-

siderably increased that the owner decided to have him destroyed. The swelling had also become much softer, and the ends of the lesion quite mobile. He was accordingly chloroformed and destroyed on November 22.

On *post-mortem* examination a considerable portion of the bony tissue was obviously destroyed, and replaced by a tissue of fleshy consistence, studded with spicules of bone. On microscopic examination the tissue proved to be a round-celled sarcoma. The bone was subsequently macerated for several months, and the soft tissues thus removed. The complete destruction of bone as shown in the photographs was revealed, together with a periostitis extending along the bone in each direction. (Mr. A. L. Sheather kindly took the photographs for me.)

ASSOCIATION OF VETERINARY OFFICERS OF HEALTH.

The Association of Veterinary Officers of Health are to hold their annual meeting this year in the Municipal Buildings, Glasgow, on Thursday, September 29. The list of contributants who have promised papers is a very distinguished one, and ought to afford a literary treat to all veterinary officers of health. The subjects to be dealt with are: "The Eradication of Bovine Tuberculosis," by Professors Bang and Ostertag (discussion will be opened by Mr. J. Malcolm, F.R.C.V.S., Birmingham); "Fungi on Flesh and other Foods in Relation to the Fitness of such Foods for Human Use," by Professer Glaister, Glasgow University; "Malignant Diseases in the Lower Animals," by Dr. Murray, of the Imperial Cancer Research Fund; and "The Relationship of Scarlet Fever, Diphtheria, and Sore Throat of Man to the Affections of the Udder of Cows," by Professor Gofton, of the Royal (Dick) Veterinary College, Edinburgh. The President this year is Mr. J. S. Lloyd, Veterinary Officer of Health for Sheffield.

It is earnestly desired that this Association, which is comparatively young, should be supported by every veterinary officer of health, and applications for membership should be sent direct to the Secretary, A. M. Trotter, M.R.C.V.S., Moore Street Abattoir, Glasgow.

Indexed B. A. L.

Abstracts and Reports.

A CASE OF TETANUS IN A MAN TREATED WITH SUBCUTANEOUS INJECTIONS OF MAGNESIUM SULPHATE: RECOVERY.

By PETER PATERSON, M.B. Glasgow,

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Since Meltzer, in 1905, showed that paralysis of nervous tissue could be induced by magnesium salts, a considerable number of tetanus cases have been treated with solutions of this salt and with highly gratifying results. The majority of the recorded cases have been treated by subarachnoid injections, while in a few the salt has been introduced into the subcutaneous tissues, but in most, if not all, these injections have been regarded as supplementary to the serum treatment. Wassermann, Babes, Kowalski, and others have had encouraging results from frequently repeated subcutaneous injections of a fine emulsion of rabbit's brain in normal saline solution. This fresh nervous matter acts, in all probability, by combining with the tetanus toxin circulating in the blood, and thus its absorption by the nervous system of the patient is prevented; it can have no action on the toxin already fixed in the patient's nerve cells. Magnesium sulphate, again, has no effect on the toxin, either fixed or free; hence, so long as toxin is being formed at the seat of infection, injections of this salt do not prevent its absorption by the nervous system. It only acts by controlling the spasms, and, by conserving the patient's strength, gives him time to form his own antitoxin. If, then, both brain emulsion and magnesium sulphate were injected at the same time, it seems to me that the patient would have a better chance of recovery than when only one of these is administered, as the magnesium salt would diminish the spasms produced by the toxin already fixed, whilst the brain emulsion would prevent, or at any rate diminish, absorption.

In the case of which the following is a short summary only the magnesium salt was employed. The patient, a coal-miner, aged 21, was admitted to hospital three weeks after he had received a small wound on the scalp from a kick. This wound must have been a very superficial one as it healed in a few days and left no visible scar; in fact, it is doubtful if this actually was the seat of infection as his hands showed numerous small cuts and abrasions, any one of which might easily have given entrance to the bacillus. The symptoms commenced six days before admission with pain and stiffness in the abdominal walls and muscles of the back. These pains gradually became worse, till on the morning of admission he had a "convulsion" which lasted about five minutes. When brought under observation the whole body was rigid, with the exception of the forearms and hands. Opisthotonos was well marked; the legs could not be moved, and the incisor teeth could be separated for about an eighth of an inch only. All the affected muscles were very hard. He complained of severe and continuous pain across the upper part of the abdomen and down both legs. Superadded to the tonic contractions of the muscles there were almost continuous cramp-like spasms. Every two or three hours these became very severe, and implicated, not only the muscles

of the trunk and limbs, but also those of respiration, so that breathing was suspended, the face became cyanosed, the pupils dilated, the pulse thready, and occasionally consciousness was lost. The temperature was 100° F., the pulse 96, and of moderate tension. A count of the white blood cells gave 12,000 per cubic millimetre, of which 84 per cent. were polymorphs. Perspiration was free but not excessive. The urine was free from albumin. During the night he was very restless and did not sleep.

The following day he received a subcutaneous injection of 10 c.c. of a 10 per cent. sterilized solution of magnesium sulphate, 5 c.c. being introduced into each thigh. Soon after this injection he obtained an hour's sleep, the first he had had for forty-eight hours. These injections, which were repeated every four hours, night and day, for two days, gave him so much relief that he frequently cried for them, even though they were very painful. After two days of this treatment the comparatively slight and more frequent spasms had almost entirely disappeared, the pain had become much less acute, and the severe spasms had become less frequent, there being one only every five to twelve hours, instead of every two or three hours as formerly. As these were still so severe as to threaten life the dose of the magnesium sulphate solution was rapidly increased till 20 c.c. were administered at one time, 10 c.c. being injected into two separate parts of the body at one time. This increased dose was repeated every four hours and continued for four days. The effect of this treatment seemed to be a prolongation of the interval between the spasms, there now being only one, or at most two, in the twenty-four hours. The rigidity of the jaws, abdomen, and back was still present, but that of the legs was passing off, as he was able to draw them up in bed, though with difficulty. The injections were now stopped, partly because the spasms were diminishing in frequency and partly because he was strongly objecting to the pain they caused him. The day after the treatment was stopped an erythematous rash appeared over his shoulders and gradually spread, till three days later the greater part of the body was covered; it then began to fade and a week later had disappeared. This rash did not give rise to any evident constitutional symptoms. At the same time he suffered much distress from a collection of viscid saliva at the back of his throat. This mucus could not be swabbed away as he could not open his mouth sufficiently to permit this, and he was afraid to cough it up in case the exertion should produce a spasm. The last severe spasm was recorded three days after the injections had been stopped, and though he still had at long intervals slight attacks of cramps, his chief complaint was the pain resulting from the injections. The rigidity was now becoming less marked, though it varied in degree from time to time, At one visit the legs, for example, could be moved quite freely, while at the next movements could only be performed with difficulty. Evidently relaxation was not a continuous process, but was interrupted by a series of long drawn out, painless, and ill-defined waves of tonic contractions, slight in degree. The abdominal muscles were the last to lose their board-like rigidity.

The patient left hospital five weeks after admission. When seen three weeks later he was about to return to his work. Throughout his illness he could swallow without difficulty, and as his thirst was great

he was able to take a large quantity of nourishment. The thirst was specially marked during, and for a few days after, the administration of the injections. During this period he took on a daily average 8 to 10 pints of fluid, consisting of strained soup, milk, water, and an occasional beat egg. The quantity of urine was not increased, but he lay soaked in perspiration. The latter may have accounted for his thirst, though the introduction of so much salt into the circulation may have been partly responsible. The bowels moved two or three times daily, and the motions were inclined to be loose. The temperature never rose above 101° F., bnt it did not fall to normal till four weeks after admission, and fully a fortnight after the spasms had ceased. The pulse varied from 100 to 120, except during a spasm, when it would mount to 130 or 140 per minute.

It would have been safer, perhaps, to have continued the injections for a day or two longer, but they were stopped for the reasons already mentioned. The great objection to this method of treatment is the pain produced by the injections, but I think this could be overcome to a considerable extent by using larger quantities of a weaker solution.

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A DISEASE OF SHEEP IN TASMANIA.[1]

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Bacteriological Investigations.

Microscopical examination of smears made direct from the various effusions, the heart, blood, spleen, kidneys, &c., of the sheep dead some time before *post-mortem* examination showed a profuse bacterial flora in each. The subcutaneous œdema contained, (1) a bacillus, often in chains of from 4 to 6, with square extremities, not unlike anthrax bacilli, but smaller and narrower; (2) a bacillus, often in pairs, some sporulating; (3) several long thin bacilli with terminal spores; and (4) a large sporulating bacillus, probably putrefactive. The heart-blood contained the above types of bacilli, and also a long filamentous organism like the bacillus of malignant œdema. The effusion from the peritoneal cavity contained all the above bacilli, with, in addition, some cocci and short bacilli. The spleen, kidney, and pleural effusion also showed a number of bacteria, the commonest being the double bacillus sporulating, which definitely stained by the method of Gram.

The smears from the sheep which was killed for examination showed apparently no organisms present in the blood, the spleen or pleural effusions; the slides smeared with the peritoneal effusion had become accidentally broken in transit, and could not be examined. The smear from the necrosed surface of the stomach (abomasum) showed a fragment of a very small nematode, probably Trichostrongylus (Str. Ostertagi, &c.), and masses of various kinds of micro-organisms, including various bacilli and cocci.

[1] The paper by Professor Gilruth dealing with this disease was published in the Veterinary Journal for May.

That the fluids were not absolutely free of bacteria at the time the animal was slaughtered was proved by incubation of the sterilized pipettes (which had been filled during the *post-mortem* examination, every precaution being taken to prevent contamination) after my return to Melbourne. The peritoneal and pleural effusions only contained a few cocci, but the spleen and blood contained numbers of bacilli, some sporulating, streptococci, and coccobacilli. The contents of these pipettes, however, were exhibiting no putrefactive odour on being opened.

Guinea-pigs inoculated with small quantities of blood, spleen pulp, and pleural fluid contained in these pipettes remained normal. In view of different and definite results occurring in similar animals simultaneously inoculated with material from the dead sheep, beyond isolating the aerobic organisms, further work with these fluids was postponed.

Microscopical Examination of Stomach of Sheep Killed while Suffering from the Disease.

Although the effusions, blood, spleen, &c., contained at the time of the slaughter so few organisms that none could be detected by microscopical examination of the smears made during the *post-mortem*, yet subsequent microscopical examination of sections of the inflamed and necrosed area of stomach gave interesting and remarkable results.

The mucosa is intensely inflamed, the blood vessels being enormously distended, with frequent small hæmorrhages. The central area of necrosis is found to implicate the whole of the mucosa, including the gastric glands, as far as the muscularis mucosæ. Here and there are small points of ulceration. The necrosed area terminates abruptly at one edge, but at the other gradually extends upwards from the base as a long narrow triangular area, covering intensely injected and inflamed tissue.

The submucous connective tissue is infiltrated with fibrinous exudate, causing the folds to be considerably distended, its blood vessels are intensely injected, and the blood corpuscles definitely hæmolysed in the hæmorrhagic areas.

On the surface of the inflamed and the necrosed areas are numerous bacteria, such as cocci, coccobacilli, and bacilli, but deep in the necrosed area, and more especially throughout the œdematous submucosa, are solely masses of bacilli, Gram positive and otherwise morphologically similar to those demonstrated to be the cause of the disease. Where the bacteria are most numerous there are small agglomerations of leucocytes, but generally the tissue is remarkable for their absence.

Here undoubtedly was the region where the bacteria had become introduced, probably by means of the parasite already mentioned, and where they had enormously multiplied and elaborated the toxin or poisonous principle which is the principal cause of such diseases.

Experiments with Material from Dead Sheep.

A guinea-pig, No. 1, was inoculated underneath the skin of the thigh with two drops of blood. Next morning (twenty hours later) the animal was found dead and cold, death having occurred some hours previously.

There was intense swelling of the whole of the inoculated limb, the opposite limb, and the subcutaneous tissues of the abdomen. The skin of the inoculated thigh was black, and gangrenous. Underneath the skin was found a large quantity of blood-stained serous exudate, with a decided putrefactive odour. On opening the abdominal cavity the uterus, which was gravid, showed a large patch of extravasation, affecting the border near the inoculated limb. There were, however, no effusions in any cavity, and the internal organs were normal, with the exception of the liver and kidneys, which were slightly congested. Microscopical examination of the subcutaneous œdema showed masses of bacteria, chiefly of the form classed as (2), but also numbers of the other varieties. The spleen and liver contained similar organisms, but the blood of the heart was apparently free.

A pipette filled with heart-blood after incubation developed some long sporulating bacilli and cocci. That these bacilli were not pathogenic organifms was proved by inoculating a guinea pig (No. 4) with two drops of the contents of the pipette without result.

Guinea-pig No. 2.—As it seemed possible this guinea-pig 1 might not have succumbed but for the advanced pregnancy, guinea-pig 2, which had previously been inoculated with two drops of the blood from the second (killed) sheep without any result, was again inoculated in the opposite thigh with two drops of blood from the dead sheep. Death resulted under twenty hours. In this case *post-mortem* showed no necrosis of the skin, little putrefactive odour, and much less subcutaneous œdema. The liver showed one or two small areas of necrosis, but otherwise the internal organs were normal. Microscopic examination of the subcutaneous fluid, &c., demonstrated bacteria similar to those found in guinea-pig 1.

At this stage it was deemed wise to test the material from the dead sheep on another sheep.

Sheep No. 1.—Accordingly a crossbred ewe about 18 months old, in good condition, was inoculated subcutaneously in the region of the groin with 0·2 cc. material, composed of equal parts of spleen-pulp and pleural effusion. The injection was made at 5.30 p.m. on July 2; 3rd, there was slight lameness and increase of temperature—103·5; 4th, lameness increased, leg being carried, the skin of thigh puffy and of slight bluish-red tint. Animal dull, with no appetite; temperature 103·5; 5th, condition as during previous day, temperature 103·5. During the three following days the general condition improved and appetite returned, though lameness increased somewhat, the livid colour became more pronounced, and the inguinal glands were swollen. The temperature remained constant at about 103·5. On the 10th the swelling showed signs of becoming circumscribed and firmer, while the glands also became much smaller and harder. After this the local swelling gradually improved, the swelling of the glands slowly disappeared, until on the 17th the only local change that could be detected was a slight depression as if a scar had formed and the lameness had entirely disappeared.

It was evident that in the small quantity of material introduced under the skin of this sheep there was present amongst the different organisms already mentioned at least one capable of setting up serious disturbance. The recovery of the animal may have been due to a natural partial immunity, or to the possibility of the mixed organisms

inducing a greater reaction than a pure culture. As will be seen later, this latter was probably the correct explanation.

Guinea-pig No. 10.—Ultimately the sporulating Gram-positive bacillus was secured in a practically pure state by passage through a guinea-pig (10). This animal was inoculated with a very small quantity, 0·05 cc., of subcutaneous exudate from guinea-pig 1. Death occurred thirty-one hours after inoculation, and *post-mortem* examination was made immediately. There was much swelling of the inoculated limb, the opposite limb and the subcutaneous tissue of the abdomen. The seat of inoculation was slightly gangrenous. There was a slight odour of putrefaction at the point of inoculation, but elsewhere it was absent. The œdematous effusion was straw-coloured and only slightly blood-tinged, unless in the inoculated thigh, where it was deeply blood-stained. The internal organs were normal, excepting the kidneys, which were congested.

The subcutaneous clearer œdema showed only a short double bacillus, and the larger double Gram-staining sporulating bacillus. The spleen and liver showed only the latter. The blood was apparently free when examined immediately after death, but pipettes of blood from heart developed the sporulating bacillus in a state of almost purity when kept at blood-heat for twenty-four hours.

Guinea-pig No. 12.—As one drop of this blood after incubation caused death, within twenty hours, of a guinea-pig (12) when inoculated subcutaneously, it was evident that the bacillus in question was the one specially pathogenic for guinea-pigs. The general *post-mortem* picture presented by this animal was similar to the previous cases, with the exception that although death had occurred a few hours prior to examination, there was no gangrene of the skin and no putrefactive odour, but a peculiar distinct odour not putrefactive.

The cause of the putrefactive change had apparently been eliminated.

Previously it may be observed that this particular bacillus had failed to grow on ordinary artificial neutral media, although pure cultures had been isolated of two anærobes (one putrefactive and one non putrefactive); also of two aerobic bacilli.

Attempts made to cultivate the bacillus on distinctly alkaline broth from which air was excluded by means of an oil covering resulted in pure cultures being secured from guinea pig 10.

Guinea-pig No. 14.—With ½ cc. of this culture, guinea-pig 14 was inoculated at 1.30 p.m. Next morning at 9 a.m. the animal was prostrate; there was great swelling under the skin of the hind limbs and along the abdomen, with some necrosis just at the point of inoculation. Rapidly the symptoms became aggravated, the animal lay on the side, and exhibited intermittent general spasmodic contractions of the muscles. Death ensued quietly at 10.30, or twenty-one hours after inoculation.

Post-mortem examination disclosed much sero-sanguineous effusion, with a little emphysema, separating the skin from the muscles, and extending forward subcutaneously to nearly the point of the chest. The liver was congested, and the posterior surface showed small areas of necrosis. The kidney was congested; otherwise the internal organs normal.

Microscopical examination showed the subcutaneous effusion at a

distance from the seat of inoculation to contain the bacilli in a state of evident purity; the necrosed liver areas contained enormous numbers; the spleen and blood one or two only here and there, and beginning to sporulate.

Guinea-pig No. 15.—As a control to the above case, guinea-pig 15 was inoculated with ½-cc. subcutaneous fluid (which contained approximately double the number of organisms present in the culture) from guinea pig 10, the same guinea pig from whose blood the organism artificially cultivated had been secured. This animal presented similar symptoms to guinea pig 14, but death did not occur till twenty-four hours after inoculation. Then the *post-mortem* appearances were similar in every way, including the small necrotic areas in the liver.

Now that a bacillus markedly fatal at least to guinea-pigs had been isolated, and cultivated artificially, it was necessary to ascertain if it were equally fatal to sheep.

The sheep previously inoculated with material from the animal which died naturally having been beyond the age found most predisposing in Tasmania, it was deemed advisable to make the experiment first on a younger animal.

Lamb No. 1.—Accordingly a ewe lamb (Down cross) in very good condition and about 8 months old was secured, and 0·5 cc. of the subcutaneous exudate from guinea-pig 14 (which had been inoculated with a culture) was injected underneath the skin of the thigh within an hour of the death of the guinea-pig (14).

Death occurred about eighteen hours afterwards, in the early morning. Unfortunately the message did not reach me till late, but the carcase was left undisturbed till my arrival. There was no evidence of struggling, the animal lying as if asleep. Blood-tinged froth was issuing from the nostrils. The body still retained some warmth, but tympany was marked. Both thighs were swollen and discoloured, and there was considerable emphysema underneath the skin, from the thighs to the axillæ.

On removal of the skin the subcutaneous tissue of the inoculated leg downwards to nearly the hoof across to the other limb and forward to the fore-limbs was infiltrated with a large quantity of effusion. Part of the muscles of the inoculated groin were black, infiltrated with gas, but fairly dry, the muscles surrounding this being pale, degenerated, and œdematous.

The œdematous fluid elsewhere in the leg was but slightly blood-tinged. There was a peculiar odour detected similar to that observed in later guinea-pigs which had died. The odour was not that of putrefaction, nor that of blackleg (which the appearance of the muscles suggested), but a special odour with a faint fishy smell.

The abdominal cavity contained about a pint of turbid reddish effusion. The intestines and stomach showed deep injection of the superficial vessels.

Spleen was somewhat enlarged and pulpy.

Liver: Congested. On the peritoneal surface were granular reddish deposits, and similar material was found on posterior surface of the diaphragm.

Kidneys were both deeply congested and pulpy, the right being the most advanced. The capsules were separated from the substance by

a quantity of gas, and the organs were broken down by large gas bubbles.

Thoracic Cavity: Contained about 10 oz. of deeply blood-stained effusion. The lungs showed intense congestion, especially of the apices. The trachea and bronchi showed marked blood-staining of the mucous membrane, and contained a quantity of frothy bloody material.

The pericardium contained about an ounce of bloody effusion. The heart contained a quantity of rather tarry-looking blood, and the endocardium was congested.

It was noticeable that the carcase itself emitted practically no odour, and that my hands only retained a marked "muttony" smell.

Microscopical examination of fluids and tissues from all portions of the body showed the presence of numbers of the characteristic bacilli, many sporulating. They were especially numerous between the muscle fibres of the necrotic dark-coloured muscular tissue. In the peritoneal and thoracic effusions a few thinner bacilli Gram negative were found, but the blood and pericardial fluid especially contained the typical bacilli in a state of evident purity.

This showed a tremendously rapid growth of these bacilli, which in less than twenty-four hours after introduction were to be found in every part of the body. To test if those present in the pericardial effusion were exactly of the same nature as those inoculated, guinea-pig 16 was injected with two drops of this material at 3 p.m. Next morning at 9 a.m., or in less than eighteen hours, the animal was found dead. The *post-mortem* appearances were exactly as in previous cases, including the necrotic areas of the liver, &c.

Virulence of Culture for Sheep.—A few-hours-old anaerobic broth culture of the bacillus found in the peritoneal effusion of the lamb was employed in this experiment. The number of organisms present was only sufficient to show a faint cloudiness on very careful examination, therefore the doses were extremely small. 0·25 cc. (about 4 drops) of this culture was injected into each of the following sheep:—Lamb 2, of the same age and breed as the previous lamb; sheep 1, which had been previously inoculated with material from the dead sheep and had recovered; and sheep 2, which a week previously had been inoculated with a culture of another anaerobic organism isolated from the dead sheep without any deleterious effect whatever. The inoculations were made at 5.30 p.m., the subcutaneous tissue of the thigh being chosen.

The following is the result of these inoculations:—

Lamb 2.—Next morning the animal was dull, with no appetite, moved when disturbed, but was slightly lame, the seat of inoculation showing a slight puffy swelling somewhat hot but not painful; temperature, 104. At 11.30 the dullness had increased, as had the lameness when disturbed. Swelling slightly larger, and respiration increased; temperature 105·4. By 12.30 the leg was carried during movement, the face had a pained expression (if the term may be employed). The animal showed a tendency to uneasiness, neither lying down nor standing up for any great length of time. The breathing, especially when lying, was very rapid, reaching 120 per minute; the pulse was wavy and dicrotic; temperature 105·4. At intervals there was a peculiar grinding of the teeth. Up till 5.30 the condition remained very much

the same, the swelling had increased but little, the pulse and respirations remained as before, as did the temperature. At 9.30 there was little change. The leg was distinctly swollen down to the hock, due to the presence of a clear effusion, as proved by an exploring needle. The temperature had fallen to 104·4. At 6 a.m. on the following day the animal was found dead. Death had resulted even from such a small dose in less than thirty-six hours.

Post-mortem Examination.—The inoculated thigh was much swollen, but showed little discoloration. There was much œdematous infiltration throughout the whole limb, practically to the toe. Around the point of inoculation the effusion was blood-tinged, but elsewhere straw-coloured. The muscles of the inner side of the thigh were dark, almost black, in colour, broken down by gas, and emitting the peculiar odour remarked in lamb 1 and in the later guinea-pigs. Around the dark-coloured area the muscles were degenerated, pale and œdematous.

Abdominal cavity contained about 8 oz. of blood-tinged effusion. The peritoneal surfaces of the abomasum and intestines were injected. The liver congested, and showed a small area of necrosis similar to those in the guinea-pigs. The kidneys were markedly congested. Spleen normal.

Thoracic cavity contained about 6 oz. straw-coloured effusion, with gelatinous masses adherent to pleural surface of lung, and causing adhesions between the lobes. The fluid, on exposure, rapidly became of a jelly-like consistency. The lungs were congested, and along the course of the vessels the perivascular connective tissue was markedly infiltrated with a gelatinous straw-coloured exudate. The pericardium contained about 1 oz. of slightly blood-tinged fluid. The epicardium, especially on the superior portion, showed numerous hæmorrhages; otherwise the tissues were normal.

Microscopical examination demonstrated the presence of numbers of typical bacilli in the affected muscle, the subcutaneous œdema, the peritoneal effusion, &c., but few in the spleen and pleural effusion, while in smears from the heart none could be demonstrated.

Sheep 2 (18 months old; previously inoculated with culture of an innocuous anaerobic bacillus isolated from dead sheep).—Inoculated with 0.25 cc. young culture at 5·30 p.m. Next morning there was slight lameness, but no swelling, disinclination to feed, and temperature 105·4. The animal, which previously had been excitable and wild, was now very quiet, but otherwise there was no symptom of illness. Throughout the day the temperature was frequently taken, and remained about the same. By 5.30 the lameness had increased, and there was distinct swelling of the inner service of the inoculated limb. At 9.30 the dullness, the lameness, and the swelling were more pronounced, and the temperature had risen to 106·5. The following morning the swelling had increased very considerably, and extended to below the hock. The skin was distinctly puffy, but not discoloured. The pulse was dicrotic, the respirations were hurried. The same intermittent grinding of the teeth noticed in the lamb was observed, but the temperature had fallen to 103·4 Death occurred quietly at 1.30, or forty-four hours after inoculation.

Post-mortem examination made within one hour after death disclosed a similar condition to that found in lamb 2. The gelatinous sub-

cutaneous effusion and the area of black degenerated muscle were more extensive. The same peculiar odour was present. The abdominal effusion was small comparatively in amount, not exceeding 2 oz. The peritoneal surface of the intestines was congested; the kidneys and liver were congested, while the spleen was normal. The thorax and pericardium contained each a small quantity of gelatinous effusion. The heart exhibited no sub-epicardial hæmorrhage, but there were several hæmorrhages present under the endocardium.

Microscopic examination showed the presence of the typical bacilli in the subcutaneous and other effusions, the necrosed muscle, &c., as before.

Sheep 1 (18 months old; previously inoculated with small quantity of material from dead sheep, as a result of which severe local inflammatory changes had ensued, followed, however, by recovery).—Inoculated with 0·25 cc. young broth culture at 5.30 p.m. The following day the animal presented a condition very similar to sheep 2, with a slightly lower temperature, varying from 104·5 upwards. There was no marked swelling, but general quietness and loss of appetite. During the second day after inoculation the temperature was lower, remaining about 103·5. The inoculated limb was swollen, as was also the opposite thigh (the seat of the first inoculation). There was some discoloration of both thighs, considerable prostration, rapid respirations, tendency to uneasiness in whatever posture was assumed, and the same intermittent grinding of teeth as observed in the others. At 7 a.m. on the morning of the third day the animal was found dead, having succumbed apparently some hours previously, or less than sixty hours after inoculation.

Post-mortem examination made at 10 a.m. disclosed a condition of the inoculated limb exactly similar to the other cases. The opposite limb was affected with a diffuse subcutaneous caseous area marking the site of the first inoculation.

The abdominal cavity contained about 30 oz. of dirty-looking sero-sanguineous fluid with a slight putrefactive odour. The intestines were injected on the peritoneal surface, and under the peritoneal covering exhibited great numbers of small bubbles of gas (evidently due to the growth of putrefactive organisms through the wall from the intestinal contents). Liver and kidneys congested; spleen enlarged and pulpy.

Thoracic cavity contained about ½ pt. of sero-sanguineous effusion, and the pericardium about 2 oz. of fluid the colour and consistency almost of blood. The lungs were normal. The heart showed some small sub-epicardial hæmorrhages, while the endocardium was deeply congested.

Microscopical examination of the subcutaneous effusion, affected muscle, the pleural exudate, and the blood showed typical bacilli alone, but the peritoneal fluid and the spleen besides these typical bacilli showed the presence of long filamentous organisms which had evidently gained entrance from the intestines, and were the cause of the distinctly putrefactive odour.

The bacillus was recovered pure in cultures from these cases.

A guinea-pig (No. 17) inoculated with 0·2 cc. broth culture from lamb 2 died in nineteen hours. The *post-mortem* appearances (the examination being made immediately after death) were similar to those found in previous guinea-pigs inoculated with fluids, with the exception

that at the seat of inoculation there was no trace of gangrene, there was little gas, and the effusion, except just around the point of inoculation, was practically free from blood-discoloration. There was some typical peritoneal fluid (sero-sanguineous, rather dirty-looking), and the liver showed the usual necrosed patches.

Rabbits.—A rabbit inoculated at 5.30 p.m. with 0·25 c.c. broth culture from lamb 2 was dead the following morning at 9.30, or in sixteen hours.

Post-mortem examination.—Large œdematous swelling affecting inoculated leg extending almost to the foot. There was no discoloration or odour. The subcutaneous effusion was clear and straw-coloured, being only blood-tinged near the inoculation puncture. The muscles were very dark in colour, and broken down with some gas formation. The internal organs were normal.

Microscopic examination of subcutaneous fluid showed numbers of typical organisms; in the degenerated and black muscle tissue they were very numerous, and many sporulating. The spleen contained very few, while the blood was free, and remained so even after incubation for forty-eight hours. In blood of other animals, though apparently absent, their existence had always been demonstrated by incubation of a pipetteful.

Another rabbit which had previously been tested with two non-pathogenic bacilli isolated from the original sheep also succumbed in under eighteen hours to an inoculation with the specific bacillus; but in this case there was little subcutaneous œdema, though a small quantity turbid peritoneal effusion was present.

Pigeons.—A well-grown pigeon inoculated at 11 a.m. in the subcutaneous tissue of the breast with 0·25 cc. culture of bacillus from lamb 2 was found dead and cold next morning at 9 o'clock.

Post-mortem examination.—The muscles of inoculated breast were swollen, degenerated, and hæmorrhagic, but exhibiting no odour. Subcutaneous tissue infiltrated with straw-coloured gelatinous fluid. In peritoneal cavity a small quantity of sero-sanguineous dirty-looking effusion; otherwise normal.

Microscopical examination.—Subcutaneous œdema, very few bacilli; degenerated muscles, bacilli very numerous; peritoneal effusion, a few bacilli—all rather longer than those found in sheep and other animals, but otherwise similar. The blood was apparently free; after being in a pipette for only five hours at blood heat, however, a number of gas bubbles were visible; and then microscopical examination disclosed a number present in each "field" of the preparation.

Rats.—An opportunity presenting itself to inoculate a rat, this was done, at the same time and with the same material as was employed to inoculate the three sheep—0·25 cc. broth culture five years old, at 5.30 p.m. Next morning the animal was dull, and showed slight œdematous swelling where inoculated. It escaped when being examined, was kicked, and caught. It did not appear to be worse as a result of the kick. Death occurred at 3 p.m.

Post-mortem examination disclosed an œdematous effusion of considerable extent in the inoculated region, but no other abnormality; the kick, therefore, did not cause serious disturbance. The fluid, on microscopical examination, proved to contain a large number of typical bacilli, and evidently this animal died, as did the others, from toxæmia, or absorption of the toxic products elaborated by the bacilli.

Pigs.—A three-months-old Berkshire was inoculated in the subcutaneous tissue of the thigh with 0·5 c.c. culture. Within twenty-four hours a large œdematous swelling had developed, but without discoloration of the skin, the animal was somewhat lame, and the temperature was 104·8° F.

For three days the swelling gradually continued to increase, extending ultimately forward to the shoulder and downward below the hock. The temperature remained high, and the appetite was small. By the fourth day the swelling had reached its maximum, as had the temperature, which then registered 105·6.

Afterwards the swelling gradually reduced, but the temperature fluctuated above 104° F. On the tenth day recovery, so far as the swelling was concerned, was complete, but for some induration in the fold of the groin, although the temperature still remained above 104° F.

Review.

KOMPENDIUM DER ANGEWANDTEN BAKTERIOLOGIE FÜR TIERÄRZTE. (Compendium of Applied Bacteriology for Veterinary Surgeons.) By Professor F. Glage, Chief Veterinary Surgeon to the Hamburg Veterinary Department.

THIS is a useful and comprehensive text book of 272 pages, destined to help German veterinary surgeons in making microscopic and experimental investigations rendered necessary in the course of their practice. It is published by the firm of Richard Schoetz, Wilhelmstrasse, Berlin, and has sixty figures in the text. The author in his preface writes: "The book submitted should contain in brief, as regards bacteriology, all that interests the official and practical veterinary surgeon and the veterinary surgeon in control of meat and food inspection in the exercise of his calling." We think that the author has carried out his intention, as stated in the preface, very well.

The specific organism of infectious and non-infectious disease is described, and in some cases the clinical symptoms it produces noted. The method of culture, growth, resistency, and pathogenity of the organism are stated, and protective and curative inoculation where usable are discussed.

With regard to the ultravisible, filtrable virus of swine fever and its tenacity to life, Professor Glage writes: "The virus is destroyed in one to four weeks by putrefaction, freezing and drying injure it little, *as well as disinfectants* (1 per cent. of sublimate not in eight days). It is killed by a temperature of 78° C. In the refrigerator the virus is not destroyed in twenty-three days, and in summer heat not in ten days." Inoculation of swine with defibrinated blood is a measure of protective inoculation which the veterinary surgeon can employ, and immunity is said to last for six months. Serum, too, may be used as a protective, but it takes longer to prepare. The doses of defibrinated blood for swine about 45 lb. is 15 c.cm., 45 to 90 lb. 20 c.cm., over 90 lb. 30 c.cm.

The organism of *Johnes disease* is described under chronic pseudo-tuberculous enteritis of cattle. It is stated that the illness attacks cows from the age of two to six years. There is great emaciation, a thickening of the small intestine (seldom of the large) for one or several metres without affection of the mesenteric glands. The organisms are shorter and thicker than tubercle bacilli, lay in clusters and nests, and are colourable by Gram. Cultures have not yet been made, and the bacilli are not pathogenic for experimental animals. One chapter out of nine comprised in the book deals with the subject of *milk control*, which, from a veterinary standpoint, is divided into a hygienic and police supervision. Ropy milk is ascribed to the *microc. lactis pituitosi* (Schmidt-Mülheim) to other micrococci and to *B. viscosus*. The author's views on how slimy milk sometimes arises would be interesting. There are things connected with the origin of this defect that no fellow seems as yet to understand. The chapter is a very useful one.

The book concludes with a very complete index, which is a god-send to a busy and enquiring man.

It will fill a gap in veterinary literature, be useful to those skilled in bacteriological technique, and awaken an interest in the causal origin of diseases, an interest which in the routine of general practice is apt to slumber. The little volume is well bound in a cover that will not easily get dirty, and the illustrations in the text and general get-up of the book are a credit to the firm whose name it bears, viz., that of Richard Schoetz.—G.M.

Miscellaneous.

ROYAL COLLEGE OF VETERINARY SURGEONS.

SPECIAL MEETING OF COUNCIL.

A SPECIAL meeting of Council was held at the College, 10, Red Lion Square, London, W.C., on Thursday, May 19, Sir John McFadyean, President, occupying the chair. The following members of Council were present: Colonel Duck, C.B., Professor Shave, Messrs. Banham, Carter, McI. McCall, Slocock, Stockman, Villar, and Mr. F. Bullock (Secretary).

The Secretary read the notice of meeting as follows:—

"I am desired by the President to invite your attendance at a special meeting of Council to be held on Thursday, May 19, at 3 p.m., when he will propose to the Council, as representative of the whole body corporate, that an address be tendered to His Majesty King George V. to express the condolences of the Council on the death of his Royal father the late King Edward VII., and also to congratulate the King on his accession to the throne. I shall be glad to know, if possible by Tuesday morning next, whether you will be able to attend."

Apologies for absence were received from all the members of Council who were not present, and in each case a cordial agreement with the object of the meeting was expressed.

The President: Gentlemen, the intimation which has just been

read by our Secretary sufficiently explains the purpose for which we are met. Although not forgetful of the fact that it is difficult for many members of Council to attend meetings other than those which must be held in accordance with the by-laws, I felt that it was right and in keeping harmony with the general feeling of the profession which we represent that we should not wait till the annual general meeting or for the next Council meeting for an opportunity to give public expression to our sense of the irreparable loss which has fallen upon us, in common with all the citizens of the British Empire, by the death of our late Sovereign his Majesty King Edward VII. Small as our profession is, compared with some others, it is large enough to admit of its members holding diverse views about many matters, but I am confident that on this subject there is the most complete unanimity. It may be doubted whether any sovereign in history ever earned from his subjects more universal or deeper feelings of loving loyalty and admiration, or was more sincerely mourned when he died, than his late Majesty King Edward.

And mingled with the sorrow which is excited by the consciousness of our share in the national loss is a feeling of deep and sincere sympathy with his Majesty King George V., Queen Alexandra, and the other members of the Royal Family in the necessarily greater sorrow which has fallen upon them. It will, I am sure, be your desire that we should give expression to this sympathy, and at the same time tender to his Majesty King George V. our respectful congratulations on his accession to the throne. We trust that he will be granted strength to bear the burden of his exalted position, that his reign may be long and prosperous, and that when it is ended he may in equal measure with his Royal father survive in the affectionate memories of his people.

I therefore beg to move that a humble address engrossed on vellum be sent to the Home Secretary for humble submission to his Majesty, and that the terms of the address be as follows:—

"The humble Address of the Council of the Royal College of Veterinary Surgeons to His Most Excellent Majesty George V., King of Great Britain and Ireland. May it please Your Majesty, We, the Council of the Royal College of Veterinary Surgeons, assembled in Special Meeting, humbly desire, on behalf of the members of the veterinary profession in Great Britain and Ireland, to be allowed to express to Your Majesty our profound sorrow at the death of our beloved Sovereign, the late King Edward VII., and at the same time to offer our respectful sympathy with Your Majesty and the members of Your Majesty's family.

"We also desire to offer our respectful congratulations on Your Majesty's accession, and humbly to declare our steadfast loyalty and devotion to Your Majesty's person and throne. We pray that Your Majesty's reign may be long, prosperous, and peaceful.

"Given under the Common Seal of the Royal College of Veterinary Surgeons, this nineteenth day of May, 1910.

"*President.*
"*Secretary.*"

The motion, seconded by Mr. Banham, was then put to the meeting, and carried unanimously. The address was accordingly signed by Sir J. McFadyean and Mr. F. Bullock.

Election of Council.

1.	J. Abson	973	7.	J. Dunstan	739
2.	A. W. Mason	938	8.	R. Roberts	681
3.	H. Sumner	888	9.	J. S. Lloyd	631
4.	G. A. Banham	821	10.	J. Clarkson	618
5.	F. T. G. Hobday	784	11.	F. T. Spencer	581
6.	Col. F. Duck	774	12.	W. Packman	493

The first nine have been declared elected. Mr. J. Dunstan was drawn by ballot to take the vacancy occurring as the result of the death of the late President, Mr. S. Locke. Mr. Dunstan will accordingly retire next year.

Examinations in Scotland.

At a meeting of the Board of Examiners held in Edinburgh and Glasgow on May 20, 24, 25, and 26, the following gentlemen passed their final examination :—

Edinburgh College.

Mr. Frank Chambers.
,, David R. Crabb.
,, Thos. J. N. Critchley.
,, Arthur Akin-Higgins.
,, Adam Kerr.
,, Vincent P. Littler.
Mr. Jas. McClemont.
,, A. D. Macgregor.
,, John Nicol.
,, John Plunkett.
,, Charles F. Shawcross.
,, John W. Sugden.

Dublin College.

Mr. Edgar Phair.

Liverpool College.

Mr. Joseph P. Railton.

Glasgow College.

Mr. Gordon McIntyre.
,, Adrian M. Howie.
Mr. David B. J. McCall.
,, David Cooper.

The following passed their third examination :—

Edinburgh College.

Mr. Lindsay A. Auchterlonie.
,, John N. Cooper.
,, Wm. D. Connochie.*
,, William Halstead.
,, Douglas A. Hosford.
Mr. Charles Masson.
,, Robt. E. Murieson.
,, Thos. F. Sexton.
,, Harry L. Torrance.

London College.

Mr. Frank E. Heath.

Glasgow College.

Mr. James N. Reynard.
,, Peter Meikle.
Mr. John Gibson.

The following passed their second examination :—

Edinburgh College.

Mr. Robt. L. Armour.
,, Arthur J. R. Bott.
,, James Conner.
,, Andrew Q. Hall.
,, Robt. L. Lewis.
Mr. William Kearney.
,, Samuel Littler.
,, James McAfee.
,, Charles Nicholson.
,, William W. Peggie.*

Glasgow College.

Mr. H. McD. Paul.
,, Alex. S. Ferguson.
,, John L. Taylor.
Mr. David Keir.
,, Robt. M. Lawson.
,, Thomas Menzies.

The following passed their first examination :—

Edinburgh College.

Mr. George Atkinson.
,, Frank Christopher.
,, John W. Hayes.
Mr. Ronald S. Littler.*
,, John W. Stanley.
,, John D. Tremlett.
Mr. Graham Williamson.

Glasgow College.

Mr. Richard T. Smith.
,, Jas. M. Dawson.*
Mr. James D. Fulton.*
,, William M. Stewart.
Mr. Tom T. Taylor.*

Marked thus * passed with Second Class Honours.

ROYAL (DICK) VETERINARY COLLEGE, EDINBURGH.

On May 23 the annual prize distribution at the above institution took place, the prizes being awarded as follows:—

Class A.

Anatomy : (1) J. W. Hayes, (2) R. S. Little.
Chemistry : (1) R. S. Little, (2) J. W. Hayes.
Biology : (1) J. S. Hayes, (2) R. S. Little.
Practical Chemistry : R. S. Little.
Special book prize presented by Dr. McDougall, G. B. Atkinson; special silver medal presented by Professor Gemmell, F. Christopher.

Class B.

Anatomy : (1) S. Littler, (2) W. Kearney.
Physiology : (1) S. Littler, (2) J. McAfee.
Histology : S. Littler.
Stable Management : (1) H. Thorne, (2) J. McAfee.
Special silver medal presented for Practical Anatomy by Dr. Bradley, S. Littler.

Class C.

Pathology : (1) W. D. Connochie, (2) W. Halstead.
Materia Medica : (1) W. D. Connochie, (2) W. Halstead.
Hygiene and Dietetics : (1) W. D. Connochie, (2) W. Halstead.
Special prize for Practical Pathology presented by Dr. Leighton, L. A. Auchterlonie.

Class D.

Surgery : (1) F. Chambers, (2) D. R. Crabb.
Meat Inspection : F. Chambers.
Clinique : (1) D. R. Crabb, (2) H. G. Lowry.
The College Bursary of £21 was won by H. Fraser; the Macfarland Medal by F. Chambers; the Edinburgh V.M.A. Medals were won by F. Chambers and D. R. Crabb.

Translations.

WEIGHT OF THE HEART AND LUNGS OF HORSES.

By Dr. FREIHERR.

Lützow.

The author has undertaken a great number of measurements and weights in horses which he has published in a comprehensive work entitled "Comparative Anatomical and Physiological Examinations in Light and Heavy Horses." From the copious material the following may be given:—

	No. of Animals Examined	Average Weight of the Heart	Proportion of Heart Weight to Living Weight	Average Weight of Lungs
		g. lb.		g. lb.
East Prussia:				
Lean mares	42	3,690 = 8·13	1 to 137	7,150 = 15·76
Fat mares	32	3,415 = 7·52	1 ,, 252·5	6,690 = 14·74
Lean geldings ...	28	3,620 = 7·97	—	6,960 = 15·33
Fat geldings... ...	21	3,620 = 7·97	—	6,840 = 15·07
Danish	26	3,560	—	7,640
East Prussia:				
Light military horses	28	4,310	1 ,, 99·0	5,510
Heavy military horses	30	4,700	1 ,, 114·0	7,600
Belgian:				
Lean mares	27	4,100	—	7,460
Fat mares	23	3,960	—	7,360
Lean geldings ...	20	3,850	—	7,470
Fat geldings... ...	35	4,140	—	7,770

(*Deutsche Tierärztliche Wochenschrift.*)

ABSCESS FORMATION OF THE SUBLINGUAL GLANDS IN A HORSE AFFECTED WITH FARCY OF THE FACE.

By PROFESSOR LIENAUX.

Brussels.

One knows that the formula that "the glands in glanders never suppurate" has its exceptions, but these are rare enough to be noted. A cab horse, of English descent, entered the college with farcy of the face. On the right side the cheek bore a large wound at its edge of irregular depth. There was a pasty swelling which was continuous into the maxillary fissure and extended up to the glands of the space. Between these and the ulcer œdema developed in the track of the lymphatic vessels, presenting several hard nodules of the volume of a pea. No discharge or appreciable lesion whatever of the usual cavities. After two days the distinct nodules opened and gave exit to white thick pus. Suppuration of the glands caused a doubt as to the nature of the lesions, but this was confirmed by examination of

the bacillus, malleination, inoculation of the guinea-pig, and serum diagnosis. Only a small number of nodules were found in the lungs. The suppurated foci of the sublingual glands were filled by cicatricial tissue; there did not exist in these glands any other trace of glanders lesions, old or recent.

(*Revue Générale de Médecine Vétérinaire.*)

PERINEAL HERNIA OF THE DOG.

By HÉBRANT and ANTOINE.

Brussels.

Dogs affected with perineal hernia present under the anus a rounded and soft tumour, often the size of a fist, little sensible, and easy to reduce. The contents are formed by the bladder, inverted or not, by the uterus, the epiploöm, or the rectum doubled up or dilated, or by several of these organs at the same time.

The bladder, when full, will give a sensation of fluctuation, and the tumour will diminish after micturation. If it is the rectum which is involved, obstinate constipation will be present, with cries when attempting to defecate, and the finger introduced into the anus will discern a deviation or dilatation of the viscera. The same rectal feeling will make clear the state, volume, and position of the prostate. If it is the epiploön which forms the hernia, the fingers will have the sensation of very mobile superimposed membranes. The womb will give the impression of a hard organ prolonging itself into the pelvis and without continuity with the anus.

The best appropriate treatment to bring about radical cure is a double surgical intervention: (1) Resection of the hernial sac; (2) fixation of the herniated organ in its normal position. These two operations have been employed separately, but then the cure is only temporary.

One proceeds as follows: The animal is fasted twenty-four hours; the regions of the perinæum, belly, and flank are asepticized; anæsthesia is produced. The hernial sac being opened one can assure diagnosis. The herniated organs are pushed back, and a strip of the sac, as large as possible, cut out from each side of the wound. Interrupted sutures are placed through its edges; the one set deep, of catgut, reunite the thickened peritoneal lips, the other, superficial, of silk, draw the edges of the skin together. They are covered with iodoform collodion.

The belly is then opened on the white line if it is a bitch, on the side of the sheath if a male, then the bladder or uterus must be fixed. If it is the rectum to be held, laparotomy is performed in the left flank. The organ is then sought for, and after having scraped it with the aid of a scalpel over a large enough surface, like the internal face of the abdominal wall corresponding to the incision wound, one fixes it to the latter at several separated points, transfixing the musculosa of the organ which one wishes to fix. It is our custom, for a large dog, to pass five suture points at the distance of a centimetre from one another, of which three are of black silk (two of which are at the ex-

tremities) and two of catgut. We prefer black silk because it is easy to find in the wound when necessary to be removed. On the abdominal wall side the suture points are put through, not only the peritoneum, but also the muscle. The cutaneous lips are turned down on the wound and fixed provisorily to each other by two or three suture points; the whole is covered with iodoformed collodion, and protected with a body-bandage of gauze and aseptic wadding. After six or seven days the black silk sutures are taken out, and the skin is then finally stitched up. During this time, which is necessary for cicatrization of the wounds, the dog remains lying; the pain in the perineal region does not allow him to sit, which is often his temporary habit. After ten to fifteen days the patient can be left to himself.

(*Revue Générale de Médecine Vétérinaire.*)

Indexed B. A.

Instruments and Drugs.

A NEW DRENCHING TIN.

By SYDNEY SMITH, Jun., M.R.C.V.S.

May I bring to the notice of your readers a drench tin which I have invented? In shape it follows the usual conical pattern, but the chief features of the invention are removable screw caps at each end of the tin. The advantages may be summarized as under:—

(*a*) With both caps removed the tin is easily cleaned.

(*b*) The tin can be filled at the big end. This is of especial advantage in the case of viscous fluids, such as treacle or gruel.

(*c*) When powder drenches are used, mixing can be brought about inside the tin.

(*d*) In all cases it is possible to see the exact height of the contents, and thus the risk of spilling over is obviated.

They are made in two sizes, and the prices of the tins have been fixed at a low figure. The sole makers are Messrs. Huish, of Red Lion Square. I may add that it is provisionally protected.

JAPAN-BRITISH EXHIBITION.

In presiding over the inaugural meeting of the International Congress of Applied Chemistry last year, His Majesty King George V., then Prince of Wales, emphasized the value of scientific research. "The rule of thumb is dead, and the rule of science has taken its place."

This has long been recognized by Burroughs Wellcome and Co., who, at a time when the supremacy of British chemical industries was being challenged by other nations, stepped forward and by the excellence of their products proved to the whole world that they, then as now, have always laid the greatest stress upon the "rule of science."

The results of their investigations into the fields of the unknown are demonstrated in their beautiful display at the Japan-British Exhibition. Their exhibits include many examples of work pioneered by them under great difficulties. As an example may be quoted the fact that the firm were pioneers in the introduction of anti-diphtheric serum in the British Empire, and also supplied the first used in America.

The work of the firm is further illustrated in the series of photographic "tabloids," which includes chemicals not only for development, toning, and other processes. but contains a distinctive preparation in "Rytol"—a universal developer, which is the result of special researches. It possesses a unique range of application.

Untiring, strenuous endeavour and vast expenditure has been required to attain these and other results. It is gratifying, therefore, to be able to record that the firm has received more than 220 highest awards at the great exhibitions of the world for the scientific excellence of their products.

Books and Periodicals, &c., Received.

Proceedings of the Royal Society of Medicine; Journal of the Royal Army Medical Corps; Transvaal Agricultural Journal; The Tropical Agriculturist; Bulletins of the Sleeping Sickness Bureau; U.S.A. Department of Agriculture (Bureau of Animal Industry).

Letters and Communications, &c.

Major Walker; Mr. Collinson; Mr. J. S. Wood; Mr. Trotter; Board of Agriculture and Fisheries; Department of Agriculture and Technical Education for Ireland. L. E. W. Bevan.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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